THE ATOM

Los Alamos Scientific Laboratory

LOS ALAMOS NATIONAL LABORATORY
3 9338 00847 0220

Volume 5 Number 1
January, 1968

THE ATOM

Published monthly by the University of California, Los Alamos Scientific Laboratory, Office of Public Relations, P. O. Box 1663, Los Alamos, New Mexico 87544. Second Class Postage Paid at Los Alamos.

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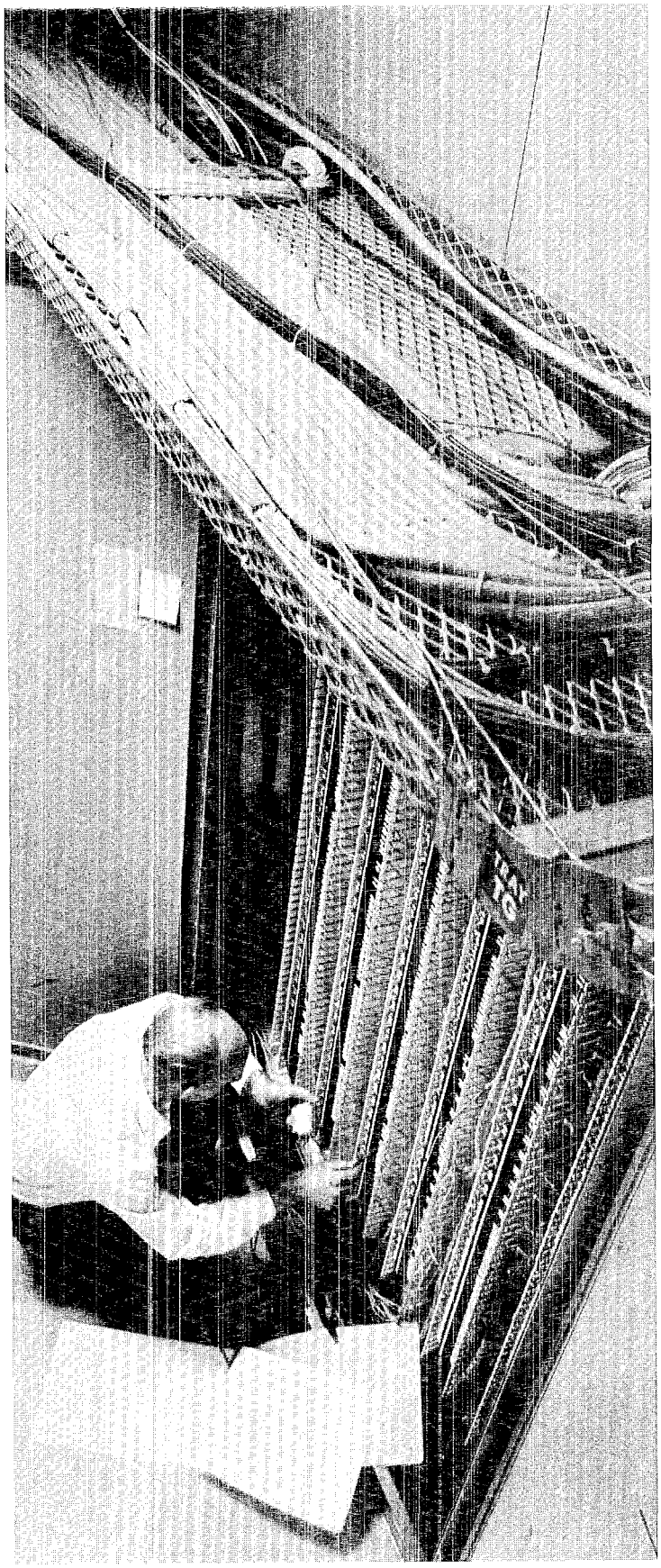
Office: D-413 Administration Building. Telephone: 7-6102. Printed by The University of New Mexico Printing Plant, Albuquerque.

Los Alamos Scientific Laboratory, an equal opportunity employer, is operated by the University of California for the United States Atomic Energy Commission.

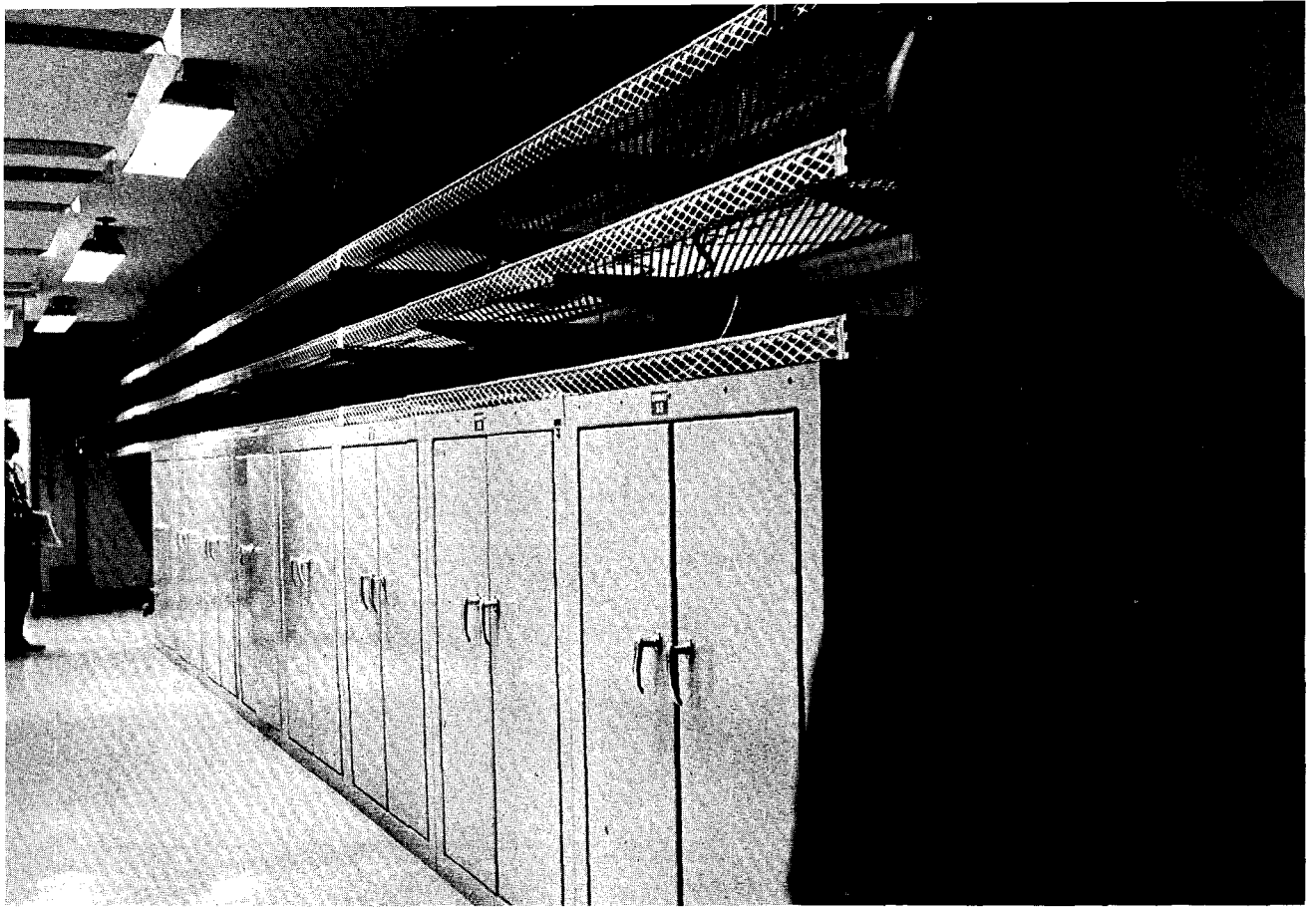
COVER:

Sixty hours after birth, Chancy slept through her first official portrait sitting for Pub photographer Bill Jack Rodgers. The mother, Nancy, produced the apparently normal offspring in spite of having received a large radiation dose in a LASL experiment. Story begins on page 7.



WIREX Aids UHTREX Construction

By Bill Richmond



There are many cabinets like these where WIREX manuals were used to compile the 400 miles of cabinet-to-cabinet wiring.

PRECEDING PAGE: Leroy Tucker, K-4, checks a connection point as specified in a WIREX manual.

A COMPUTER PROGRAM known as "WIREX"—developed by personnel of the Los Alamos Scientific Laboratory—is able to cut by more than 25 per cent the time previously spent in preparing drawings for certain electrical construction work.

Normally the directions for placing the thousands of wires and cables for electrical connections in a construction project are contained in engineering drawings. In some cases hundreds of these drawings are required for distribution to all craftsmen concerned.

But by the use of WIREX, many of these drawings can be eliminated, and all the instructions can be listed in tabular form.

The idea of WIREX originated with Bob Warner, K-4 alternate group leader, in connection with the UHTREX (Ultra High Temperature Reactor Experiment) project at LASL. Warner noted that hundreds of nearly identical wiring drawings would be required for installation of instruments and control wiring on the UHTREX project. He suggested to Ken Duerre, K-4, and Jim Case, ENG-1, that some type of computer program might be developed to simplify the wiring problems.

Case and Duerre then worked out the wiring requirements for UHTREX and decided how best to convey this information to the electricians. And, with few changes, the basic program provided by Case and Duerre evolved into the final version of WIREX.

Instead of blueprints, the wiring information—which includes wires, cables, terminals, connections, etc. —is fed into an IBM 7090 computer. The computer then prints out, under appropriate headings, the wire tabulation lists. These lists are bound into manuals and distributed to the craftsmen who now have all the instructions they need to complete the job.

The primary advantages of WIREX are improved accuracy, time saving and versatility.

The record-keeping involved in

the WIREX system occupies considerably less storage space than is required for conventional drawings since records may be retained on computer cards or magnetic tape.

Another advantage is for job revisions, because the sole requirement is a new computer card, and all the affected lists are automatically updated.

The job of the electrical craftsman is also simplified by the use of WIREX. He follows a simple check list, instead of tracing a wire on a drawing, and thus knows all he must to do the job.

The WIREX manual for the craftsman includes six basic categories — general notes, material notes, cable routing, cable length summary, channel wiring and cabinet wiring.

All WIREX listings are presented to the wiring crews in the same sequence and are in the logical order of wiring progress. The first list in the package, "general notes," gives all general instructions, special instructions, special routing details and any other information which might be required before an actual start on the job is initiated.

This listing is followed by the "material notes" where cable and wire types, indicated by a number, are defined, and their sources of supply are indicated. Other items, such as seals and connectors, are also listed with quantities required and supply sources.

The third list, "cable routing," is a table of all cable or wire runs involved with this particular package which gives the cable number, its type number, where it starts and stops and its routing. If the cable leaves the containment area, the listing calls for a seal and gives its size number. The length of cable required is also given, and the WIREX program sums all lengths of each cable or wire by type number in a "cable length summary" list as an aid in ordering sufficient material to complete the job. With this information, the cables are pulled through their specified routes and numbered.

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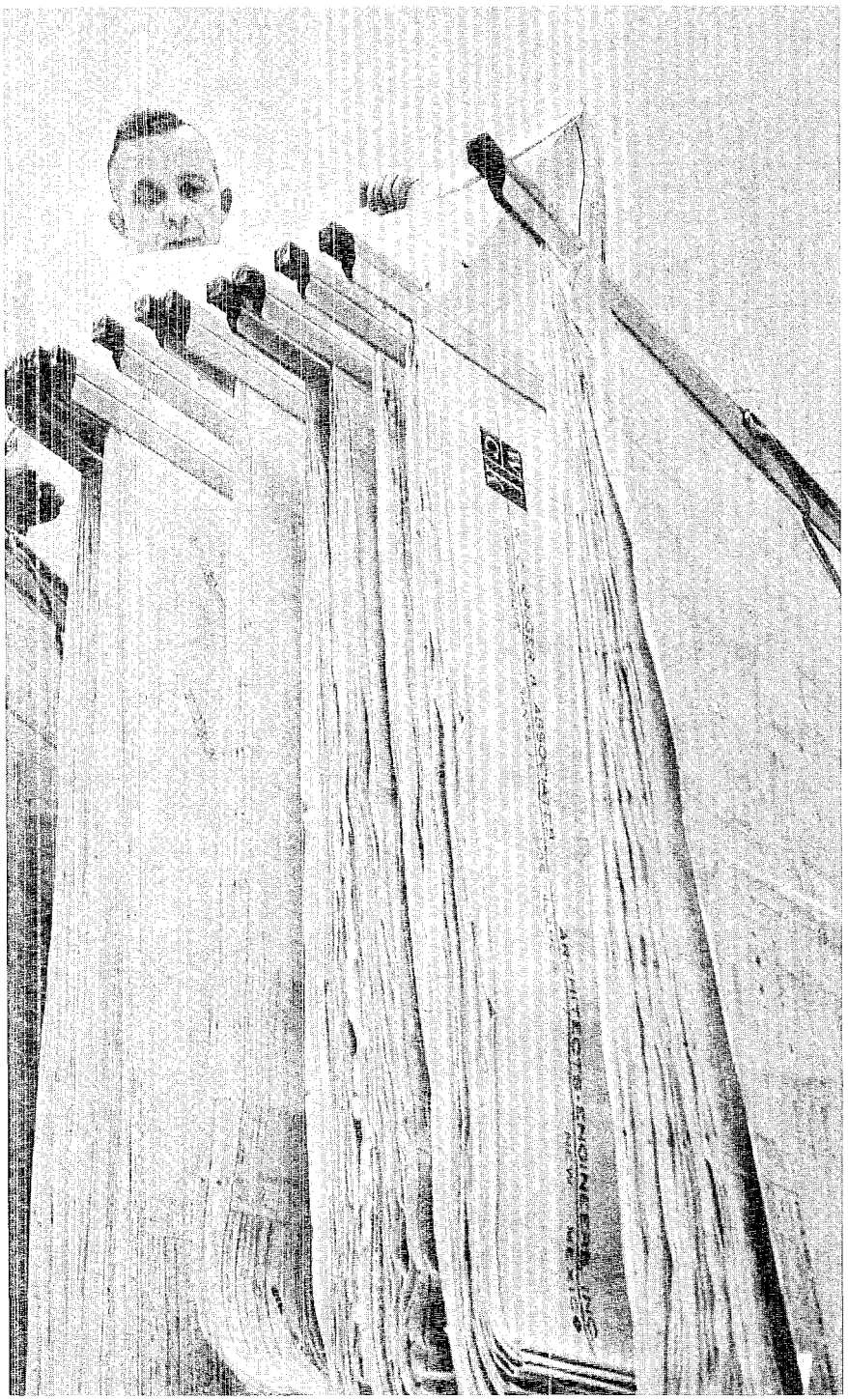
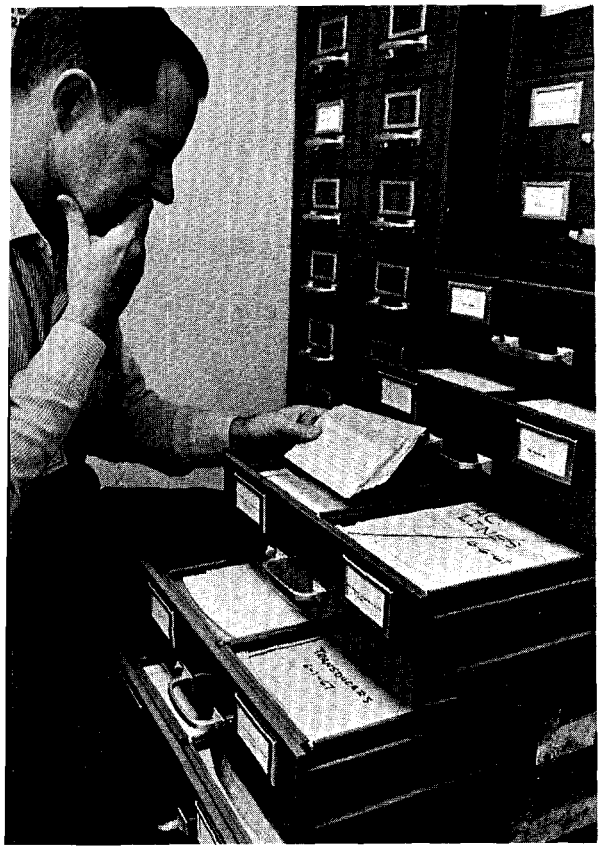


Ken Duerre, K-4, is almost hidden by the multitude of drawings that would have been required without WIREX.



In only five drawers, Jim Case, ENG-1, finds all the computer cards needed to compile the WIREX manuals.

Bob Warner, alternate K-4 group leader, Ken Duerre, K-4, and Jim Case, ENG-1, compare a completed wiring job with the instructions in a WIREX manual.

WIREX . . .

continued from preceding page

The next listing, the "channel wiring list," gives the path numbers, color codes and connection points for the wires in each cable to the various devices such as transducers and motors.

The final group of listings are the "cabinet wiring lists." The cabinet is identified by its name and room location. All cables entering and leaving this cabinet are identified by cable number. Each wire in each cable is identified by path number and color. The listing also denotes which path is on which terminal.

This process is continued until all of the paths of this WIREX package have been connected.

The scope of the electrical work in UHTREX can be appreciated by noting there were 13,000 paths using an estimated 100,000 wires with a total of 400 miles of cabinet-to-cabinet wiring. A rule of thumb established early was: "If a *complete job* consists of fewer than 100 paths, it is not worthwhile to WIREX it."

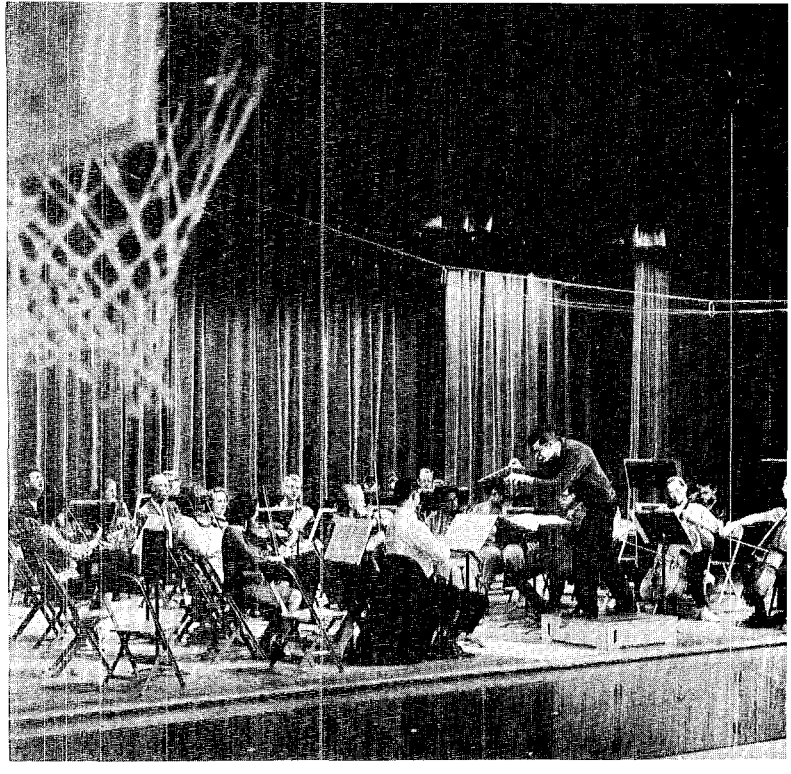
Personnel who were not electrical draftsmen filled data sheets and produced finished lists for electrical systems which they had designed or in which they were otherwise involved. This job was easily done, and few errors occurred due to misunderstanding the functions of signals or circuits.

The electricians' response to the WIREX approach on UHTREX was affirmative. Where WIREX was utilized, the complete job was done using WIREX lists — no other information was required. But, as a safety factor, a full set of drawings was compiled for the first part of the UHTREX wiring on which WIREX was used. When this first part was completed using WIREX it was checked against the drawings and was 100 per cent accurate. Thus, WIREX proved itself on the first test, and the remainder of the job was completed with wiring errors nearly non-existent.

An important contribution made by WIREX, according to those involved, was that it forced both the designers and the electricians to work in a systematic manner.

The WIREX program was proved on the UHTREX facility to be flexible, and it could be used for wiring jobs on other projects. A number of other laboratories and organizations have expressed interest in what has been done with WIREX and have indicated they would like to use it. For this, and other reasons, a LAMS report—LA-3807-MS —is being prepared and should be available within a few months.

The Music Makers



Don Gerheart brings in the first violins during a pre-concert rehearsal on the stage of the Cumbres Junior High School gymnasium.

After a 20-year record of musical accomplishments, the Los Alamos Choral Society and the Los Alamos Sinfonietta have cut two records. A compilation of some of the best efforts of the past two years' concerts, the records are representative of the kind of music these organizations have been performing for the community.

The first Choral Society-Sinfonietta record includes "Miriam's Song of Triumph" by Franz Schubert, "Alleluia" and "Last Words of David" by Randall Thompson and "A Song of Thanksgiving" by R. Vaughan Williams. The record features Karen Stopher Stapleton as soprano soloist and, as an added attraction, the 50-member children's choir which was assembled and rehearsed by John Ward, CMF-5, particularly for "A Song of Thanksgiving."

A variety of choral music comprises the second record: "The Peaceable Kingdom" by Randall Thompson, "Motet for Double Chorus" by Johannes Brahms and two works that had never been recorded before, "Song of the Spirits Over Water" (for male chorus) by Franz Schubert and "Psalm 136" by Wilhelm Shutz. The records are available through John Ward.

Both Choral Society and Sinfonietta (originally called the Civic Orchestra) can trace their organizational beginnings to the home of mathematician Donald Flanders and his wife who originally invited friends to their home to sing madrigals. When the neighbors complained of the din produced by the enthusiastic group in the thin-walled Sundt apartment, they moved to the old nursery school, and there the Los Alamos Choral Society was born.

The first public concert by the Choral Society took place at Christmas time, 1944. They and an orchestra also directed by Dr. Flanders performed Handel's "Messiah" which was so well-received that it became an annual Christmas concert.

One historic first was the atomic kettle drum used in the 1945 concert. This Christmas concert is noteworthy for the ingenuity that overcame the problems of staging a concert in a "secure" town. There was no kettle drum in the community, and Director Robert S. Dike, P-16, needed one. A mail order catalog provided the drum head, but the rest of the drum was comprised of part of the ballistic shell of a "Little Boy" atomic bomb, with water faucet handles for adjusting the drum head. The drum worked fine, but the security guards heard about it and nearly scuttled the whole program. A compromise was finally reached by constructing a screen in front of the orchestra high enough to mask the "shape" of the drum.

Another outstanding concert in the early years occurred in 1946 when the combined choruses and orchestras of Los Alamos and Santa Fe drew an audience of more than 1,200 persons. The tenor soloist for this concert was base commander

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Music Makers . . .

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Col. Austin W. Betts, now Lt. Gen. Betts, chief of research and development for the Department of the Army.

During the winter of 1947-'48, the Los Alamos Civic Orchestra was formally organized under the sponsorship of the Community Council, then the only source of funds for such an organization. Four of the charter members of the orchestra are still active in Sinfonietta: Elizabeth Graves, P-6, Rosemary O'Connor, GMX-11, Arno Roensch, SD-3, and Walter Weber, P-1.

Sinfonietta has always actively encouraged participation by the high school students in town. There are several families with two generations participating: Elizabeth Graves and her daughter, Marilyn; Rosemary O'Connor and her sons, Lonny and Tom; Arno Roensch and his son, Paul; Fred Ribe, P-15, and his son, Fred, Jr.; Don Cromer, CMF-5, and his son, Roy; Joan Johnson and her children, Brian and Kay; Morris Battat, K-1, and his son, Ken; and Meg Neher and her son, Brian. David Cole, a 1960 graduate of Los Alamos High School and a former student member of Sinfonietta, is now teaching elementary strings in the Los Alamos school system.

Gaelen Felt, now with EG&G, John Winks, J-3, and Kathleen Manley, wife of LASL Research Advisor John Manley, were the next three directors for Choral Society. By this time, Choral Society and Sinfonietta were presenting two concerts each year—one light opera and one pops concert. Then, in 1948, Mrs. Manley joined forces with John Macy, now director of the U.S. Civil Service Commission, and the Little Theater group to produce Gilbert and Sullivan's "H.M.S. Pinafore." The following year, this group formed the Los Alamos Light Opera Association. Sinfonietta has provided the orchestral phase of every Light Opera production.

Mrs. Manley continued to direct the Choral Society until the winter of 1951 when Robert Carpenter, formerly in P-14, again directed the group in the "Messiah."

The following year, C. C. Robinson, minister of music at the United Church, presented the Choral Society in "Israfel," an original choral work by design engineer Robert Dike.

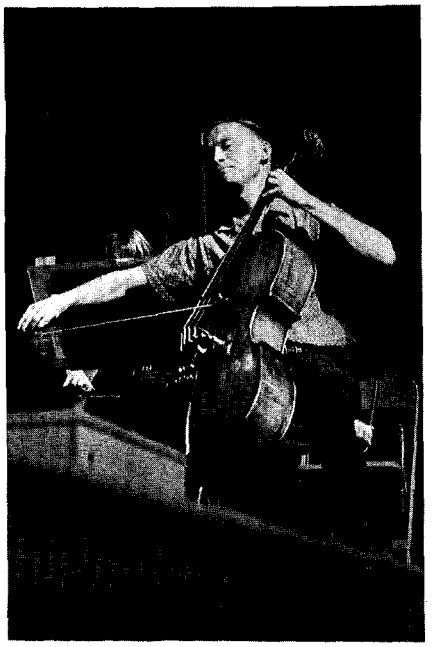
John D. Seagrave, P-DOR, took over the podium in 1953.

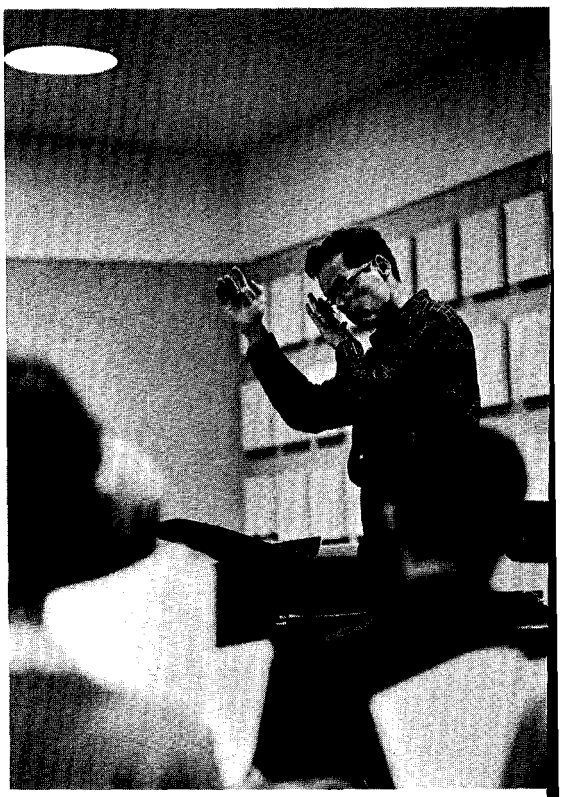
When the Manleys returned from the University of Washington, Kay again took over direction of the Choral Society. One of her most interesting concerts was "Singing Through the Centuries," presented in 1961. The script was written by Rosalie Heller and narrated by Frank Evans. During the performance, as the speaking script and musical program progressed, Joe Moody painted a huge background mural illustrating the history of choral music.

From 1960 to the present, Avery (Mrs. Darragh) Nagle, Kenneth Cooper, N-3, Herald Kruse, J-14, and John Ward, CMF-5, have directed the choral members in rehearsal and concert.

The Los Alamos Sinfonietta also operates as an independent organization. At least once a year they give a concert, completely independent of either Light Opera or Choral Society, which usually features a local instrumental soloist. Some of the past artists have been Robert Richtmyer, a LASL consultant, Leslie Peck, then in T-DO, his wife, Marjorie, Cerda Evans, T-2, and Allan Malmberg, T-7.

The next concert of the Los Alamos Choral Society and the Los Alamos Sinfonietta, jointly directed by John Ward, is scheduled for 8:15 p.m. Jan. 13 at Pueblo Junior High School gymnasium in Los Alamos. This concert will be repeated Jan. 14 at 3:15 p.m. at St. Francis Cathedral in Santa Fe.





ABOVE: Allan Malmberg, T-7, past director of the Los Alamos Sinfonietta was the featured cello soloist in the 1967 fall concert. BELOW: John Ward, CMF-5, directs one of the regular Monday night Choral Society rehearsals.

No human baby ever had better care than Chancy, the "monkey who couldn't be." Wrapped in a blanket for protection from drafts, she gets twice-daily bottle feedings from H-4 animal caretaker Steve Cordova.

'Nancy' Sheds New Light On Effects Of Radiation

While large doses of radiation have been known to render animals sterile or to cause mutations in offspring or to cause death, one animal in a Los Alamos Scientific Laboratory study has managed to defy science all three ways. This heroine is Nancy, a Macaca speciosa monkey who took part in radiation studies at the Health Research Laboratory.

First: Nancy should have died from radiation-induced aplastic anemia. She and seven other monkeys received 1528 rads of gamma radiation starting in the fall of 1964. Seven died from this thrice-lethal dose, but not Nancy.

Second: Nancy should not have been fertile. At least in the opinion of Drs. L. M. Holland, H-4 research veterinarian, and John Spalding, H-4 radiobiologist, it was highly unlikely that she would have remained fertile after such a large radiation dose. But she became pregnant in June, 1967, after being caged with a male monkey named Chow for about two months. This doubling up in the animal quarters was more for convenience at the time rather than with any real hope that an offspring would result, according to Dr. Holland.

Third: On the evening of Dec. 7, Nancy delivered a live, healthy, apparently normal female baby—named Chancy—weighing 500 grams the day after birth.

This event, presided over by Dr. Holland, serving for the first time as an obstetrician for a monkey, occurred after nearly a month of watchful waiting on the part of Spalding, Holland, Pub Photographer Bill Jack Rodgers and a host of other interested "monkeys uncles." The month's wait followed a false labor, relatively common in first-time human mothers as well.

There is probably no other case on record where any mammal has received such a large radiation dose

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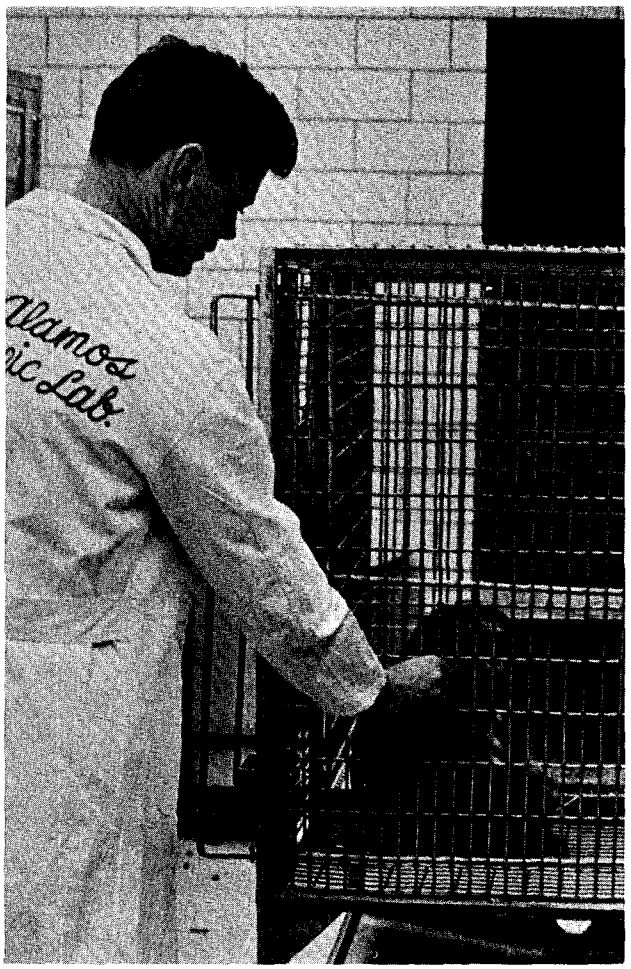
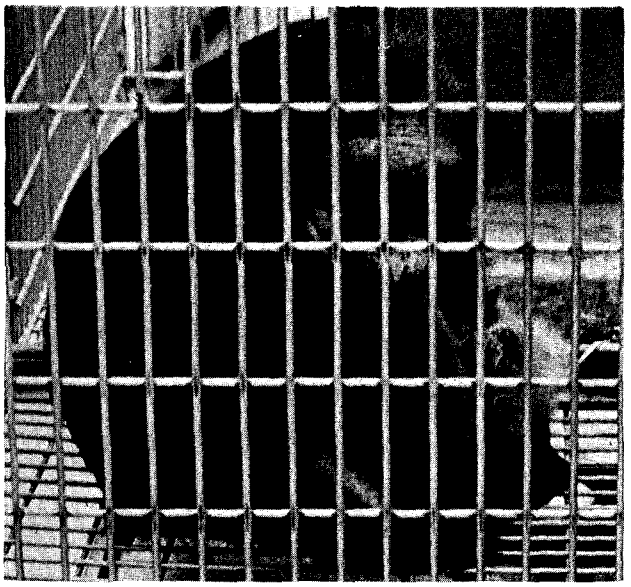


ABOVE: H-4 veterinarian L. M. Holland checks Nancy's condition after delivery on the evening of Dec. 7. BELOW: Holding hours-old Chancy, Nancy glares at Pub photographer Bill Jack Rodgers.



Radiation Effects . . .

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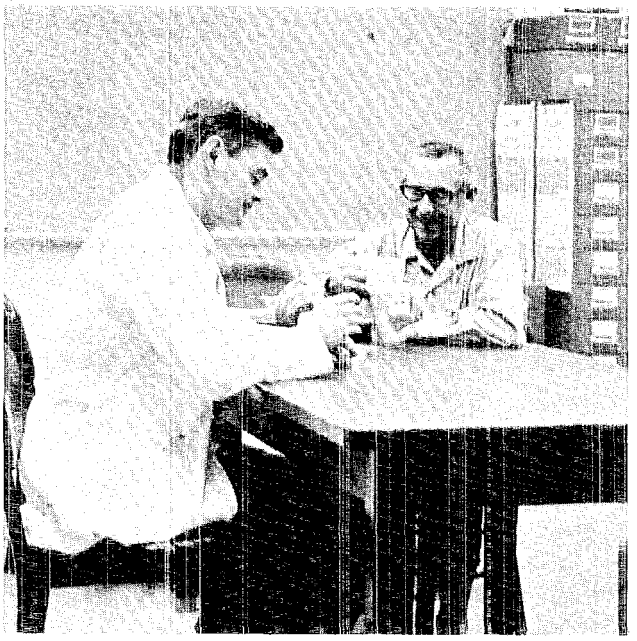
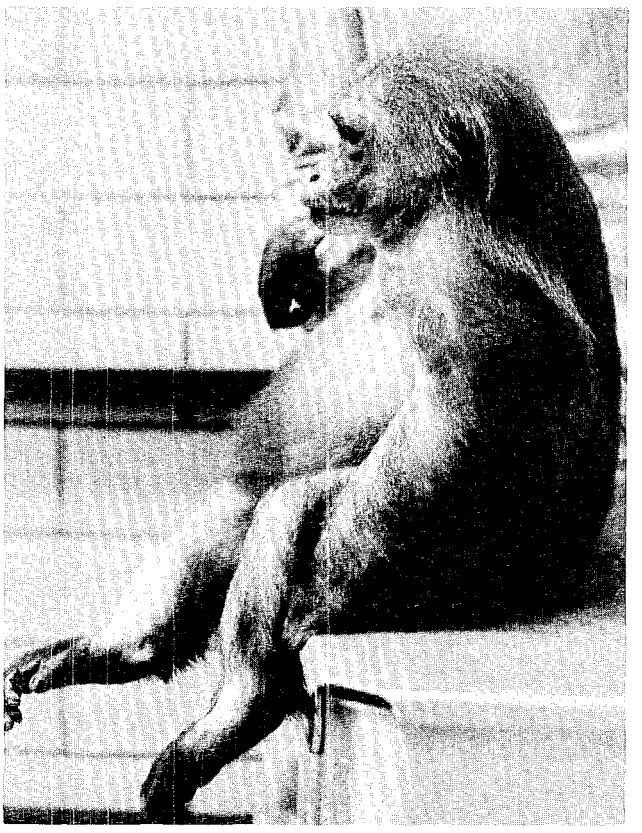
and reproduced. This would indicate, according to Spalding, that individuals differ in their resistance to radiation damage, and apparently at least some females remain fertile after being exposed to radiation levels which are lethal to others. The females of some other species (rodents for example) fail to recover fertility once they have been rendered infertile. Males may become infertile by radiation exposure and recover. An accidental exposure of approximately 300 rads to a man is known to have caused sterility for about three years.

The radiation dosage necessary to sterilize the human female is not well known, but is probably quite high if Nancy's performance is any indication. Since the monkey is physiologically similar to man, extrapolation of experimental results from monkeys to man may be reasonably accurate so the human female is perhaps as resistant to radiation as the monkey.

Blood tests on the eight monkeys used in the radiation effects experiments showed that Nancy had consistently greater ability to recover bone marrow function. The reason for this is unknown. The seven monkeys who died showed rapidly declining bone





ABOVE: Safe delivery of Nancy's daughter Chancy was celebrated with coffee all around by H-4 personnel. Marty Holland, left, and Jake Spalding talked over the rigors of delivery and plans for raising the baby. RIGHT: A very pregnant Nancy kept interested H-4 personnel on the alert for nearly a month after a false labor early in November.

marrow function after exposure, with little recovery.

Nancy's radiation exposures were received in the following manner. Initially she was given 500 rads at the rate of two rads per hour for 10 days. Four months later she received fractionated exposures at the rate of one rad per minute. Fourteen doses were given over 365 days with carefully calculated recovery periods spaced at various intervals. For example, if 200 rads were given in one day, 10 per cent of the damage was assumed to be irreparable. With no additional exposure, 50 per cent of the 180 rads of reparable damage may be repaired in a 28-day period. Additional exposures were spaced so that the accumulated dose of irreparable damage kept increasing at a theoretical rate. In the case of seven monkeys, theory failed, resulting in death.

The purpose of the experiment was to accumulate data on effect of radiation damage on space travellers and their ability to recover and perform useful work on long interplanetary voyages. Trained monkeys were exposed at LASL's TA-51 exposure facility in an experiment conducted in cooperation with the Air Force Aeromedical Research Laboratory of Holloman Air Force Base. The monkeys were trained to perform work functions in a simulated space capsule while undergoing radiation exposure.

Originally it had been planned to use Macaca speciosa monkeys rather than the common rhesus variety for this experiment. The former are more docile and amenable to handling. However, they possess well calloused buttocks which the so-called astromonks learned to use for avoiding the mild electric shock stimuli which motivated the monkey work periods. This lack of performance cancelled the first experiment planned for January, 1965, and made it necessary to switch to the less-padded rhesus monkeys.

Nancy had been in the group of Macaca speciosa monkeys undergoing training at the famous "monkey college" at Holloman AFB for the first experiment. She flunked out and joined the group which were to provide additional data by receiving larger radiation exposures, but not performing work functions.

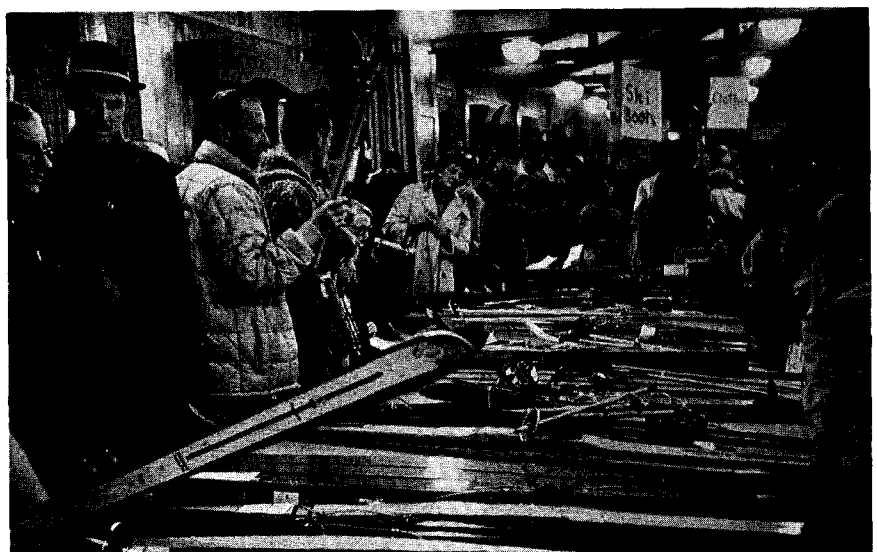
Although raising a monkey is difficult at best, Spalding said, Chancy was holding her own at the ripe old age of three weeks.

Combine bargain basement sale day, a county fair balloon ascension and a large church social—and the result might resemble the Los Alamos Ski and Skate Sale. Bargain hunting winter sports enthusiasts jammed the Recreation Hall last month to buy and sell equipment. During the two-night sale, volunteer workers from the sponsoring clubs, the Los Alamos Skating Association and the Los Alamos Ski Club, along with Senior Girl Scout Troop 4, manned the accommodation desk where sale money is held for sellers. Although ski and skate sales at other cities usually charge a fee, no charge has ever been made at the local sale.

Winter Sports

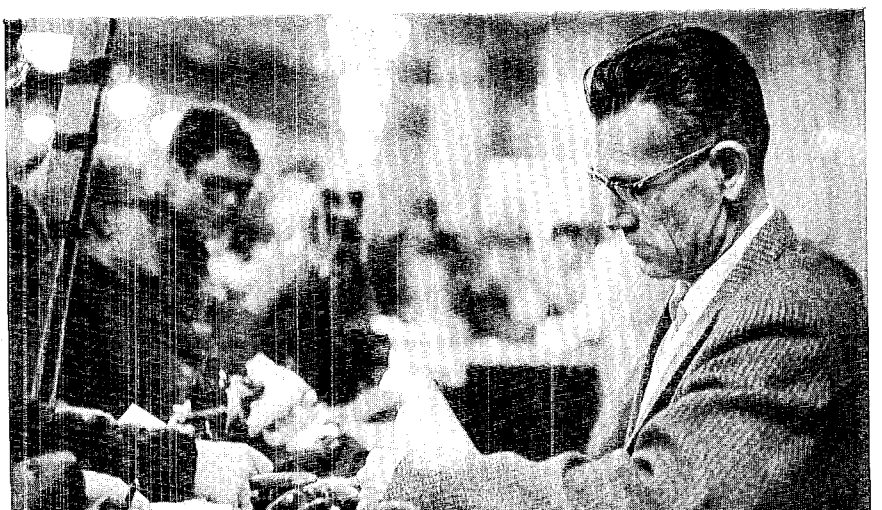
On The Hill

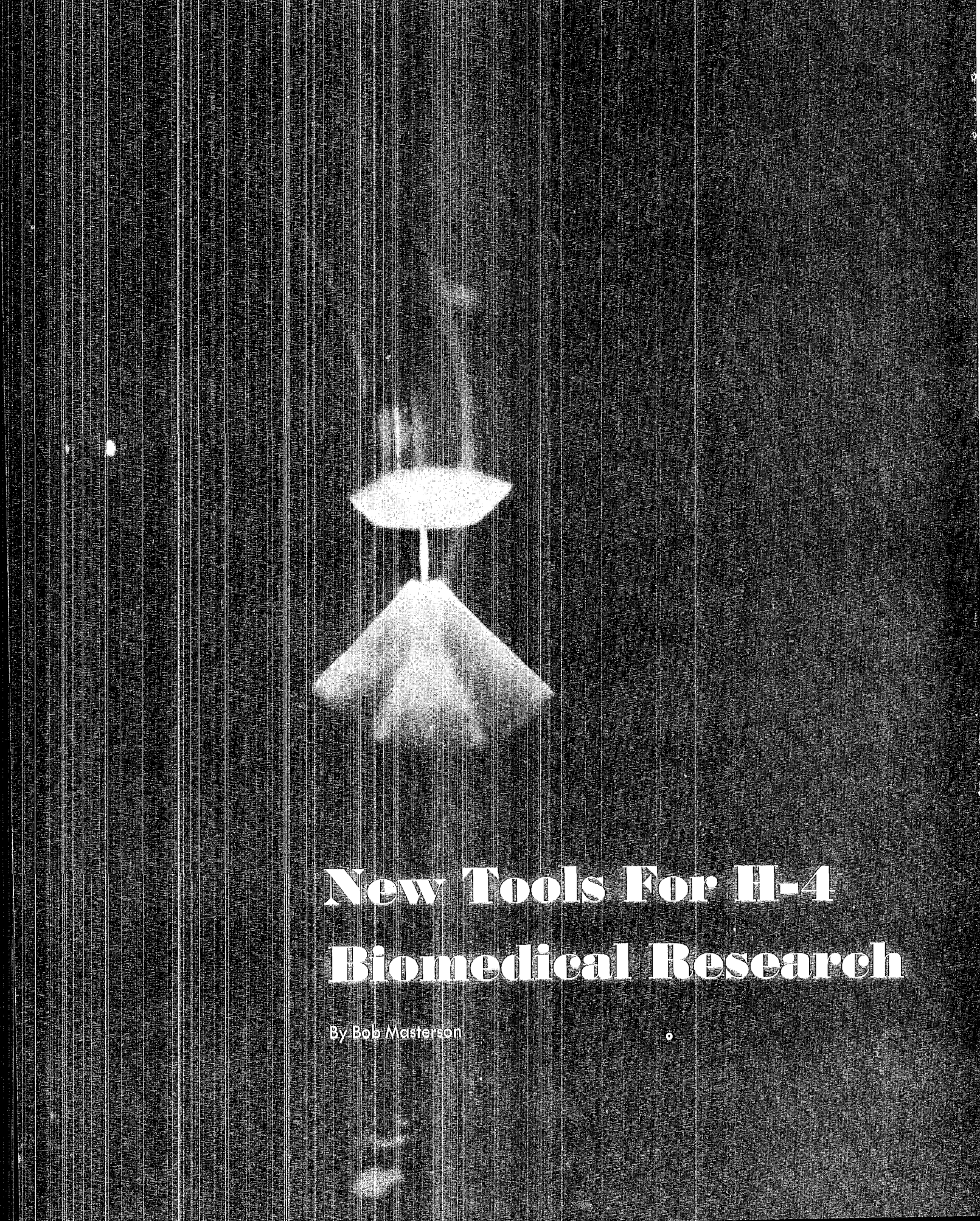
LEFT: Julia Evans ,7, daughter of P-4's Doyle Evans, was delighted with a pair of bright red skis. BELOW: Prices ranged from 20 cents to nearly $100 on the large table piled with skis and poles. From left: Bob Streetman, N-2; James H. ("Stretch") Fretwell, CMF-9, and Marvin Van Dilla, H-4, size up the merchandise.



Skating rink in Los Alamos Canyon is popular among skaters of all ages; there have been more than 18,000 admissions each skating season for the past several years. In addition to "open" skating, there are times set aside for figure skating, hockey, mothers and tots and other groups. Skating Association members give free lessons each Monday night, and the Figure Skating Club sponsors lessons each Sunday morning. Hockey enthusiasts play "just for fun," and anyone who enjoys hard, fast skating is invited to participate during the hockey sessions. Full rink schedule is on page 24.

ABOVE: Ski boots were a popular item at the Ski and Skate Sale. LEFT: Conrad Longmire, alternate T division leader, makes careful selection of a pair of skis. BELOW: Ted Dunn, alternate personnel director, helped keep finances straight between buyers and sellers.





New Tools For H-4 Biomedical Research

By Bob Masterson

In the early 1930's a British scientist named Cecil Price-Jones and his co-workers spent about a year measuring the diameters of 50,000 red blood cells (500 each from 100 different patients). In so doing he obtained the first really comprehensive picture of the size distribution of blood cells and achieved a degree of immortality—hematologists still call cell-size distribution curves "Price-Jones curves."

The number of cells measured in a year by Price-Jones is just the number of cells that can be measured *per minute* by an electronic cell volume spectrometer in use by the biomedical research group (H-4) of the Los Alamos Scientific Laboratory. This device has been developed into a separator which not only measures the cell volumes but also sorts the cells according to size.

The separator is one of the instruments being developed by the biophysics section of H-4 as part of their general program of developing measuring and counting instruments and applying computer techniques to provide faster and better means of acquiring and analyzing biomedical research data. These instruments have potential clinical as well as research applications.

Wright Langham, H-4 group leader, has been active in the program of instrument development. He explained, "In the field of biological and medical research the trend is more and more to making precise measurements rather than gross observations. Biology is becoming increasingly quantitative rather than just descriptive. In addition, biological function or malfunction is increasingly being studied at the cellular or even molecular level, and there is a great need for instruments and techniques capable of accurately and rapidly measuring properties and composition of individual cells and cell components.

"In the physical sciences, such as physics and chemistry," he said, "great advances have been made in developing new equipment for the acquisition and analysis of data, and we in H-4 are trying to keep abreast of these developments and are looking for ways in which they can be applied to biological problems. Of course, this effort has grown out of, and is shaped by, the specific needs of the H-4 research program."

The biophysics section, led by Marv Van Dilla, got started in this field several years ago when the group began to get deeply involved in cellular and molecular biology. One of the first problems encountered was that of speeding up and automating the existing manual process for determining cell concentration (cells per cubic centimeter) in cell cultures – that is, a large colony of single cells growing and dividing in a nutrient solution.

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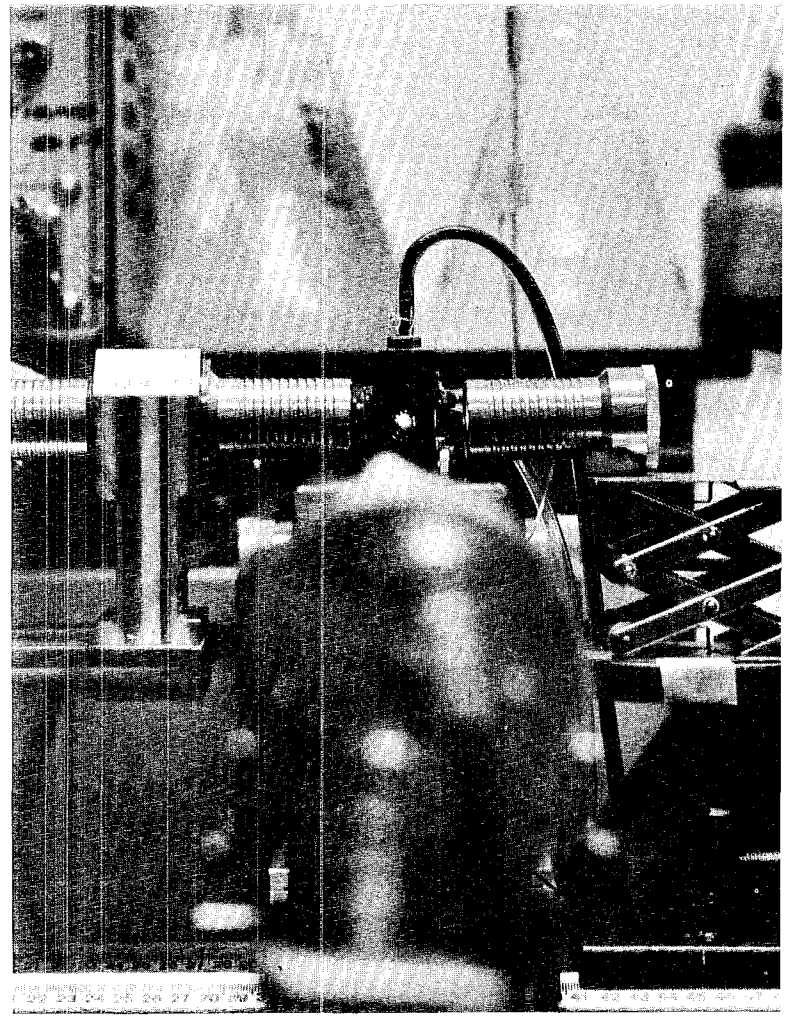
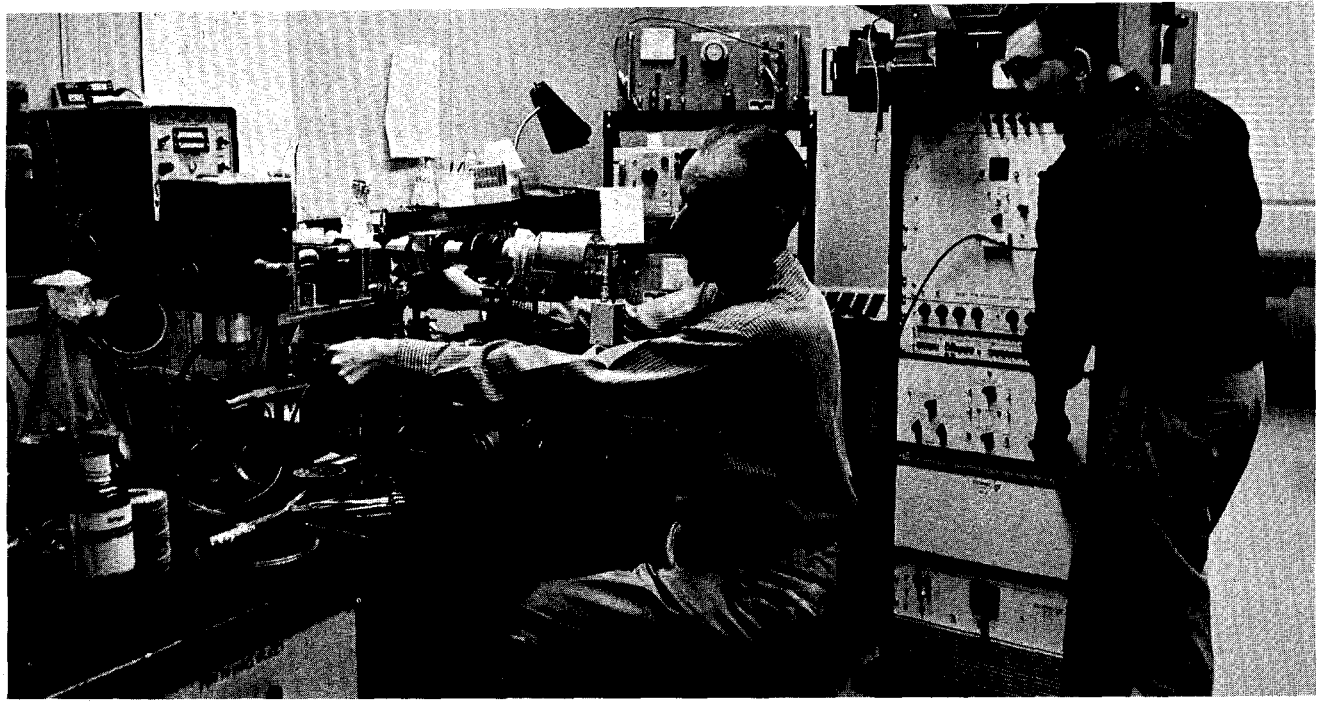


Cells, which have absorbed a fluorescent dye such as acridine orange, flow up through the flow chamber of the fluorescent cell photometer, are illuminated through a chamber window by a beam of blue light coming from the left, and fluoresce. The fluorescent light passes out of the flow chamber through the window facing the camera and into a photomultiplier tube (out of focus in the foreground). FACING PAGE: The blue light from the mercury-vapor lamp passes through windows in the flow chamber and projects this image of the chamber and the tiny stream of cells, here simulated by ink particles for calibration purposes.



Marv Van Dilla, seated, looks over fluorescent cell photometer H-4 is developing. At left is mercury-vapor lamp producing a beam of blue light to activate fluorescent dye absorbed by the cells. Directly in front of Van Dilla is the photomultiplier tube that detects bursts of light from the cells and converts them into electrical pulses. At right, Paul Mullaney operates the pulse-height analyzer that sorts and totals the signals from the photometer.

Biomedical Research . . .

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A Coulter cell counter (named after its inventor, Wallace Coulter) with limited capability for spectroscopy was obtained and used for determining cell concentrations. Modifications were made which greatly increased its reliability for use as a cell volume spectrometer for rapid and accurate measurement of the distribution of cell volumes. This spectrometer was then developed into the electronic cell separator.

The electronic cell volume spectrometer consists essentially of a container divided into two sections by a partition. A hole through this partition allows cell culture to flow from one side to the other. The diameter of the hole (100 microns) is approximately ten times the diameter of the cells being counted. (A micron is one millionth of a meter.) Electrodes are immersed in the cell culture in the two sections, and appropriate instrumentation measures the electrical conductivity between the electrodes, which is determined primarily by the conductance of the hole. As a cell passes through the hole, the conductivity is changed by an amount proportional to the volume of the cell, since cells are nonconductive. If the flow rate through the hole is known, the number of cells per cubic centimeter (cc) of cell culture and their individual volumes can be measured.

The signals from the electrode circuit, converted to voltage pulses, are processed by a device called a multichannel pulse-height analyzer. This instrument, widely used in nuclear physics and radiochemistry to analyze various radiation and charged-particle spectra, is a sort of electronic computer that senses the size of the pulses and sorts them into bins. Each bin, or channel, represents a narrow range of sizes such as 9 or 10 microns. The device also totals up the number of pulses in each bin and displays the results as a graph drawn electronically on the face of a cathode ray tube and prints out the data on paper tape. This graph shows the number of cells of each size range that have passed through the hole. The cell volume spectrometer can count as many as 50,000 cells per minute and has been used extensively for studies of cell life cycles and cell populations by the cellular radiobiology section of H-4.

One task accomplished by the spectrometer has been the measurement of the blood cell volume distribution for all the species of laboratory animals in use at H-4.

Work with this instrument led Mack Fulwyler of the biophysics section, currently finishing his work for a Ph.D. at the University of Colorado Medical Center in Denver, to the development of his cell separator. Fulwyler combined the principle of the electronic cell spectrometer with an idea developed at the Stanford Research Institute for a rapid-response, direct-writing recorder. In the Stanford de-

vice, the conventional pen, with its relatively large inertia, was replaced by a high-speed stream of electrically-charged droplets of ink. These droplets move down between electrically-charged plates and are deflected by the plates to give an ink line recording of the signal impressed on the plates.

In Fulwyler's separator, which has been patented by the AEC in his name, biological cells in suspension in a saline solution first pass through a volume sensor where their size is measured electronically as in the spectrometer. The cell suspension then enters a droplet generator from which it emerges as a tiny jet. A piezoelectric crystal vibrating at about 70,000 cycles per second and coupled to the jet of solution by a plastic acoustic focusing rod causes the jet of cell suspension to be broken up into small, uniform, evenly-spaced droplets. At the instant a droplet pulls away from the jet, it is electrically charged, by means of a time delay circuit connected with the cell-size sensing unit, by an amount proportional to the volume of the cell contained in the droplet.

As the droplet moves between a pair of charged plates, it is deflected into collection vessels by an amount depending on the size of the charge it carries and therefore on the size of the contained cell. Thus, living cells can be sorted into separate vessels according to their size.

One of the chief users of this device, which is currently under commercial development by an instrument company, has been Ernest Anderson of the cellular radiobiology section. This section is studying the life processes of cells and cell systems in order to be able to determine the effects of radiation on a cell in fundamental terms. In order to understand the mechanism of radiation damage it is necessary to understand the nature of the life cycle in a normal, unirradiated cell. It has long been known that cells in the process of division seem to be more sensitive to radiation, and Anderson and his coworkers are studying the process of cell division and its relationship to cell volume and cell age, working with cultures of mammalian cells such as Chinese hamster ovary cells.

Cells in a culture don't all behave in the same way or live the same length of time, so something other than time is needed to determine the biological age of a cell. Cell growth and volume must somehow be linked with cell age, and Anderson and George Bell (T-DOT) have worked on a mathematical model in which cell volume is a function of time, and the probability of cell division is also a function of time. This model has been fairly successful in predicting the behavior of cells in culture, but further experimental data are required.

Anderson wants to determine the probability of cell division as a function of cell volume. This involves separating cells of particular volumes into colonies and measuring the rate of division of each colony of

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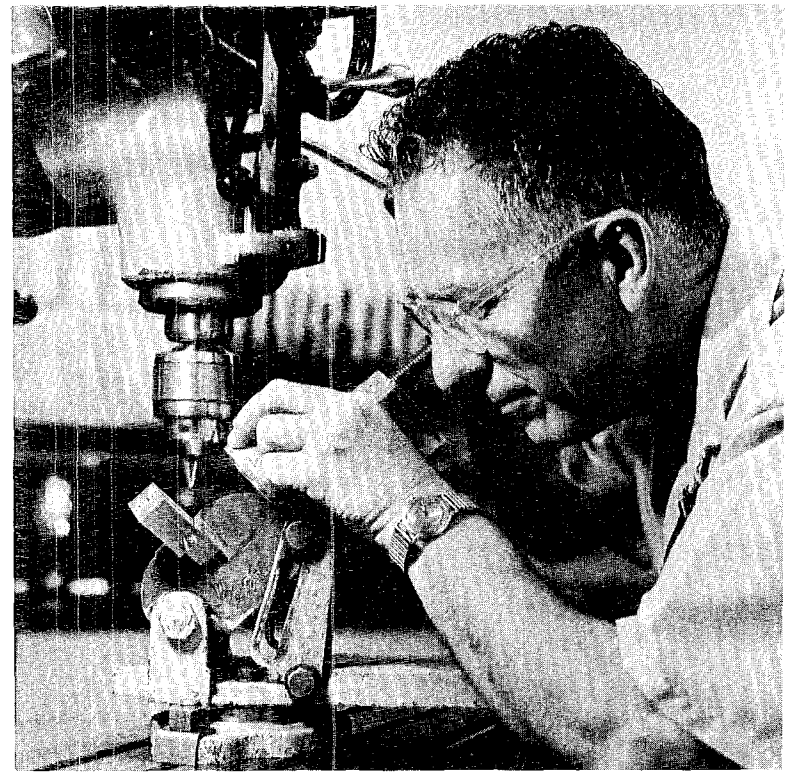
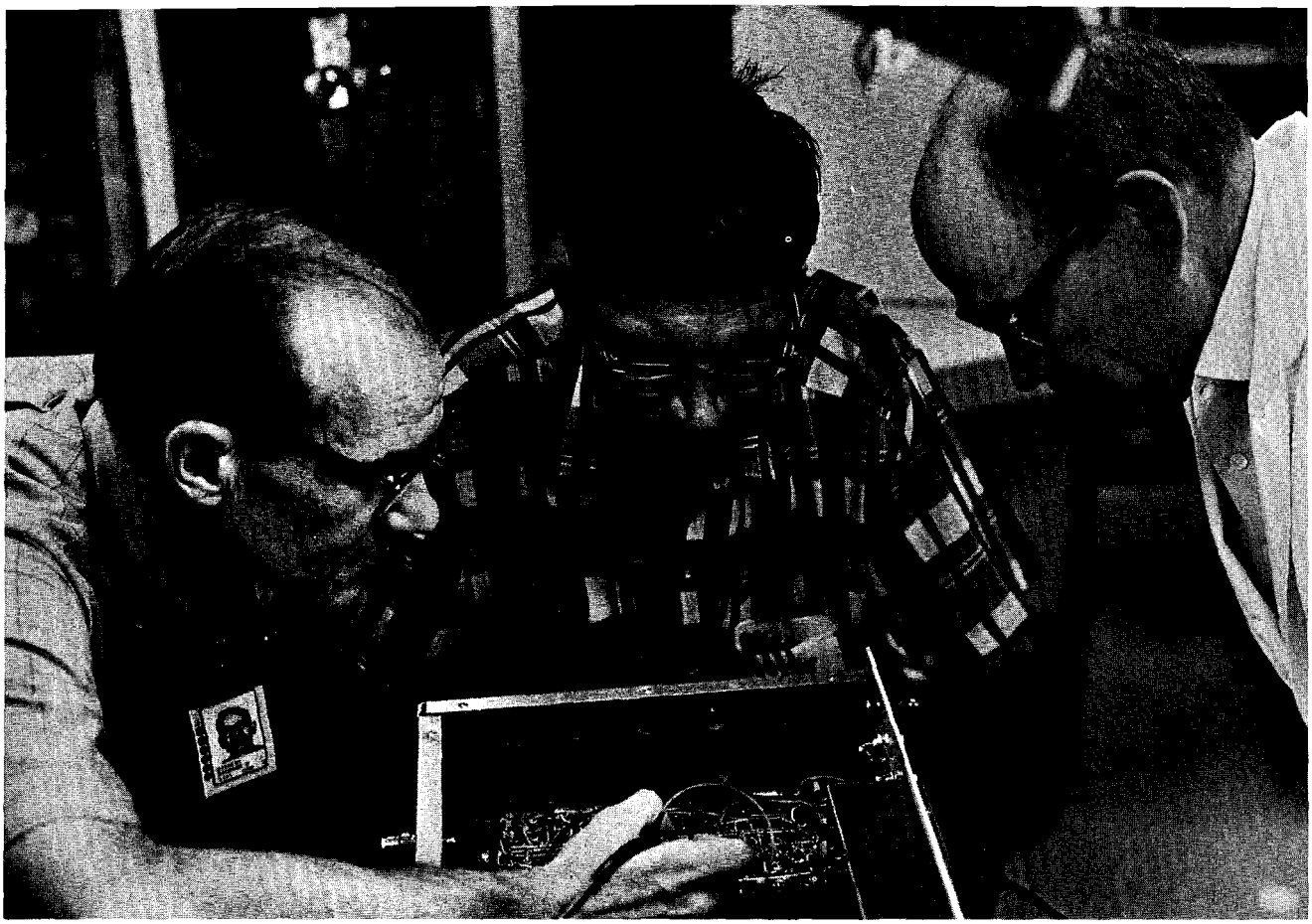


James Coulter, SD-5, of the H-4 branch shop, does some very precise and delicate drilling on a new flow chamber for the fluorescent cell photometer.



Dick Hiebert, left, and Breck Glascock, P-1, discuss electronics for fluorescent cell photometer with Jim Perrings, H-4.

Biomedical Research . . .

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cells. This work is complicated by the fact that cell colonies have a critical size—that is, they have to have a density of at least 50,000 cells per cc and a total volume of at least 50cc (2,500,000 cells total) in order to live and reproduce properly. Since the cells being separated may constitute only five per cent of the original cell population, this means that 50,000,000 cells may have to be run through the separator in order to get enough cells of a particular volume to culture.

Present results of this work indicate that after the cells reach a certain volume their probability of undergoing division drops. This doesn't fit existing theories and indicates that much more experimental work and study remain to be done. Anderson is hopeful, however, that this research may be able to provide such information as whether a cell is sensitive to radiation only during division or if the damage only shows up at the time of cell division.

The Fulwyler cell separator has many other scientific applications, one of the most exciting of which is in the field of medical diagnosis. Many diseases—for example, multiple myeloma, mononucleosis and leukemia—affect blood cells, and preliminary work has been done on using the cell separator to investigate the abnormal blood cells caused by such diseases. Results to date hold promise that some day the cell separator may find clinical application in detecting certain blood disorders.

The work on the separator has been followed by a new project. About a year ago the biophysics section began looking at optical methods of detecting cells. They looked at the old and very useful technique of cell staining, in this case with fluorescent dyes, and discovered that they could detect individual cells by the fluorescence of the dye and also by means of light scattered by the cell.

This has led to a new instrument, called a fluorescent cell photometer, with at least as great a potential for research and clinical applications as the cell separator. The photometer measures the amount of dye taken up by individual cells, and since this dye takeup is a function of the biochemical activity of the cell, the photometer is expected to be a powerful tool for the study of such activity.

With the photometer, a fluorescent dye, such as acridine orange, is added to a cell culture and is taken up by the cells. The cell culture is then

pumped into a water-filled flow chamber with small windows. The chamber and the orifices leading the cell culture solution into and out of it are designed so that the cell culture passes through the chamber in the form of a tiny stream only 75 microns in diameter. The cells line up in this stream and pass through the chamber one at a time at the rate of 10,000 to 100,000 cells per minute.

A beam of blue light, which activates the dye causing it to fluoresce, is focused onto the cell stream through one of the windows in the chamber. The flashes of fluorescent light from the cells pass out of the chamber via another window and are detected by a photomultiplier tube which produces an electrical pulse proportional to the intensity of the light. This pulse is then fed into a multichannel pulse-height analyzer which sorts and adds the pulses and produces a distribution curve showing the number of pulses of each intensity and, therefore, the numbers of cells taking up various amounts of the dye.

The cell fluorescence work has been done using a very intense mercury-vapor lamp, but an argon-ion laser which emits blue light of the proper wavelength (4880 Å) will shortly be put to use as the light source. This laser is not only many times brighter than the mercury-vapor lamp, but also requires only very simple optics rather than the complicated optical system needed with the lamp to collimate and focus the light into the 0.1 millimeter diameter beam needed.

In addition, with this laser it will be possible to focus the light scattered at small angles (less than two degrees) by the cells due to the process of diffraction into a second photomultiplier tube. Since the amount of scattered light is a function of the cell size, this output shows the distribution of cell volumes. Preliminary scattering experiments with a small helium-neon laser confirm the possibility of a dual sensor, measuring two cellular properties simultaneously.

The possibilities of the photometer for cellular research are enormous, since by choosing the appropriate dye a whole range of cellular biochemical functions can be studied.

The acridine orange dye currently being used has the property that it glows green when tied up in the cell nucleus and glows orange when tied up in the cell cytoplasm. There is evidence that in the nucleus it stains DNA and in the cytoplasm RNA. This opens up the possibility of being able to measure directly the DNA-RNA relationships so important to cell division and genetics in general.

A new fluorescent dye has just been received that dyes only the cell membrane, which is very important since everything going into or out of the cell must pass through it. With this dye, the photometer could be used to study cell membrane function. Fluorescent dyes are widely used to study the process of antibody

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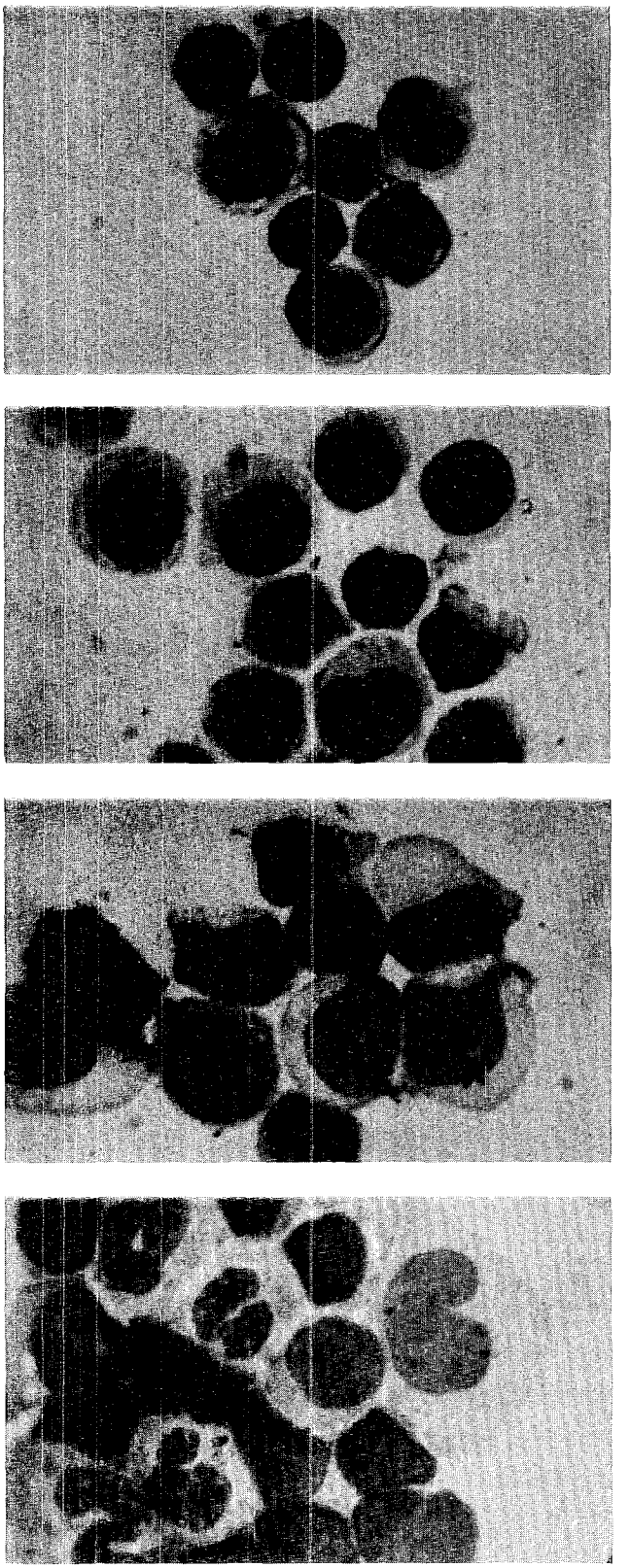
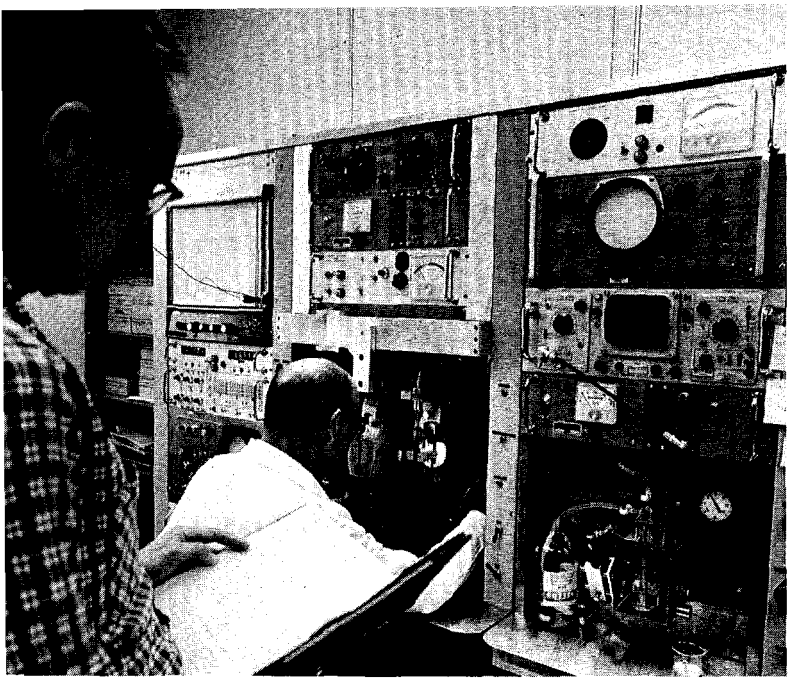
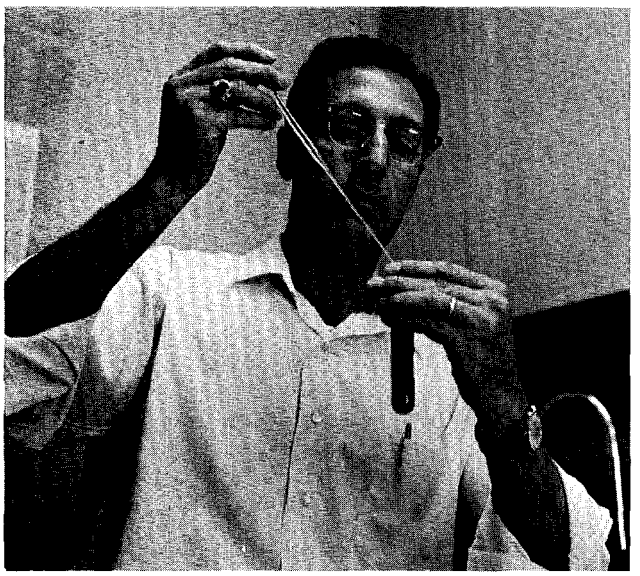


Four different sizes of white blood cells from a patient with infectious mononucleosis were separated by the electronic cell separator.



Ernest Anderson looks over data being taken by James Perrings with the cell separator invented by Mack Fulwyler.



Ted Trujillo prepares a sample of blood for processing by the cell separator.

Biomedical Research . . .

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production. The cells producing antibodies—the substances that destroy invading bacteria or foreign protein in our bodies—are thought to be phagocytic cells, but little is known about the site of production or about which cells produce antibodies. Phagocytic cells are freely moving cells, such as the white blood cells, that are produced in the bone marrow, spleen, lymph nodes and liver. By staining bacteria with a fluorescent dye (fluorescein), phagocytic cells producing antibodies could be located and studied since the antibody coats the producing cells and ties it to the bacteria being attacked.

It would also be fairly simple to use the scattered-light, cell-size signal to control the fluorescent light detector so that dye-uptake data would be taken only from cells over and under a certain size. If, for example, small bacteria were mixed up with cells, the fluorescent light signals from the bacteria would be rejected and would not distort the statistics on the cells.

This device, too, clearly has potential medical applications. An obvious one would be the detection of abnormal cells, such as cancer cells, which would not take up a dye in the same manner as a normal cell.

Future plans call for work on new cell separation methods using a fluid switch activated by a signal from the photometer. In the switch—a fluidic bistable developed for use in nonelectric amplifiers and computers—the cell stream would be diverted into one of two channels by small control jets activated by signals from the photometer. In this way cells could be separated on the basis of size, using the signal from the scattered light, or on the basis of biochemical function or malfunction, using the fluorescent light signal, or even some combination of both. By cycling the cells through the system several times or using several photometers and fluidic switches in series, a cell culture could be separated into several groups and would allow cells with certain types of functions to be cultured separately and studied.

Working with Van Dilla on the development of the fluorescent cell photometer are biophysics section members Paul Mullaney (optics), Ted Trujillo (biological technology), Phil Dean (theory and electronics) and John Larkins and Jim Perrings (mechanical and electrical design). In addition, Jim Coulter, SD-5, of the H-4 branch shop, has contributed greatly to the design and fabrication of the instrument; Dick Hiebert, Jim Gallagher and Breck Glascock, all of P-1, have worked on the design and construction of the electronics required; Berlyn Brixner, GMX-9, has provided assistance and advice on the optics; and Frank Harlow of T-3 was consulted concerning fluid dynamics.

This interdisciplinary cooperation, one of the great strengths of an organization such as LASL, will undoubtedly continue in the future to help H-4 to develop even better and more useful equipment for biomedical research.

Fifteen technicians of group K-4 will complete training and qualify as operators of LASL's new Ultra High Temperature Reactor.

J. C. Elder organized the training program. He said each man will have spent approximately 150 hours in classroom lectures, 400 hours in study and four to five hours' qualifying time in each of 24 areas of reactor operation. All the men have experience and training in the operation of Armed Forces reactors. At LASL they have concentrated on special features of UHTREX and on the operation of gas-cooled reactors in general. The subject material follows Atomic Energy Commission suggestions and specifications, Elder said.

Five of the men will have to spend additional time qualifying as supervisors. Their studies will require them to spend extra time on administration, safety procedures, overall operation and health physics.

The training period has extended over the past 18 months, Elder said, because the men worked part time on studies and part time on actual installation of equipment for the new reactor.

Completing their training are: **H. M. Ainsworth, T. E. Allen, W. D. Barney, R. E. Brodd, P. A. Dolin, Dennis Hall, D. E. Heifer, J. H. Kottman, C. W. Ramsey, M. H. Roberts, L. G. Speir, J. N. Wofford, P. W. Woodard, C. L. Woodcock** and **N. E. Wibel.**

William E. Keller, CMF-9, is on professional research and teaching leave at the University of Sussex, Brighton, England. Keller left last month for the six-month appointment, where he is visiting lecturer in the department of mathematical and physical sciences. During this period he is also conducting research in low-temperature physics. Keller joined LASL in 1950. He received B.A., M.A. and Ph.D. degrees in physical chemistry from Harvard University. Keller's wife, Helen, accompanied him on this assignment.

Henry Laquer, CMF-9, is the author of a new booklet, "Cryogenics, The Uncommon Cold", just published by the Division of Technical Information of the Atomic Energy Commission.

The booklet is the newest in the AEC series on "Understanding the Atom", printed in Oak Ridge, Tenn., for distribution to the general public.

Laquer has been a member of LASL's cryogenics group since 1947. His work is in the fields of solid state physics research, generation of high magnetic fields and superconductivity.

short subjects

The Los Alamos Scientific Laboratory will participate in the President's Summer Youth Opportunity Program this coming summer. Approximately 40 young people from economically disadvantaged homes in the surrounding area are expected to be employed in this program.

Persons between the ages of 18 and 21 interested in applying for this program should contact the New Mexico State Employment Service in Espanola, N.M., telephone Espanola 753-2285. Deadline for application is Jan. 15. The New Mexico State Employment Service will be responsible for the selection of candidates for the program and will certify them as to their eligibility based on economic need.

All candidates selected and certified by the New Mexico State Employment Service for employment in the program will be required to complete the standard LASL employment application form as well as other documents related to AEC security clearance procedures.

The Los Alamos Scientific Laboratory Summer Youth Opportunity Program will be in addition to the regularly sponsored LASL Summer Vacation Replacement Program and the LASL Summer Graduate Student Program.

Nine men from the Los Alamos Scientific Laboratory spent about two weeks last month conducting studies from LASL's airborne laboratory, an NC-135 jet aircraft flying over Alaska and the Yukon Territory.

Three phenomena were included in the studies --the aurora borealis, cosmic rays and the earth's magnetic field. The magnetic field data will be correlated with the same type of data taken by a satellite in orbit 6.6 earth radii from the earth's surface. The men made detailed studies of certain emission lines from the aurora, and throughout the mission they monitored the cosmic ray background.

Neel Glass, J-16, served as scientific commander on the flights, with **Robert Peterson,** J-16, as deputy. Others who took part in the mission are **Lucien Black, Leston Miller, Dick Tatro** and **Richard Wakefield,** all J-16, and **Joseph Hollinrake, Dan Stillman** and **Walter Wolff,** all J-8.

The Technical Side

Sixth International Conference on High Energy Accelerators, Cambridge, Mass., Sept. 11-15:

"Prospects and Uses for Meson Factories" by Louis Rosen, MP-DO (Invited talk presented by D. E. Nagle)

Presentation at the American Industrial Hygiene Association Meeting, Southern California Section, Los Angeles, Calif., Sept. 14:

"Current Problems and New Developments in Respiratory Protective Devices" by E. C. Hyatt, H-5

International Conference on Localized Excitations in Solids, University of California, Irvine, Calif., Sept. 18-22:

"On the Thermodynamic Equilibrium of the System of Gas Plus Crystal With Isotopic Defects" by G. Benedek, Instituto Di Fisica dell" Universitá, Milano, Italy; R. F. Wallis, United States Naval Research Laboratory, Washington, D.C.; A. A. Maradudin, University of California, Irvine, Calif.; I. P. Ipatova and A. A. Klochikhin, both A. F. Ioffe Physico-Technical Institute, Leningrad, U.S.S.R.; and W. C. Overton, CMF-9

Presentation at AEC and Contractors Safety and Fire Protection Meeting, Argonne National Laboratory, Argonne, Ill., Sept. 19:

"Scientific Adventuring and Misadventures" by Dr. T. L. Shipman, H-DO, and R. Reider, H-3

Presentation at the Kiwanis Club, Albuquerque, Sept. 20:

"The Los Alamos Meson Factory" by D. E. Nagle, MP-DO

Presentation at the Lions Club Meeting, Los Alamos, Sept. 21:

"Performance of Trained Monkeys Exposed to Gamma Rays" by L. M. Holland, H-4

Presentations at Health Physics Society Meetings: West Pennsylvania Chapter, Pittsburgh, Pa., Sept. 25; New England Chapter, Winchester, Mass., Sept. 27; Cincinnati Chapter, Cincinnati, Ohio, Sept. 28; and the Blue Grass Chapter, Frankfort, Ky., Sept. 30:

"The Nuclear Weapons Incident in Spain." by W.H. Langham, H-4

Seminar at the University of Hawaii, Honolulu, Hawaii, Oct. 4:

"Solar Eclipse X Rays" by H.V. Argo, P-4 (Invited talk)

Nuclear Metallurgical Society Meeting on Plutonium Fuels Technology, Phoenix, Ariz., Oct. 4-6:

"Thermal Conductivity of Uranium-Plutonium Carbide Fuels" by J.A. Leary and K.W.R. Johnson, CMB-11

Presentation at the "Long-Range Biomedical and Psychological Effects of Nuclear War", Princeton, N.J., Oct. 4-7:

"The Nuclear Weapons Incident in Spain" by W.H. Langham, H-4, and "Performance of Trained Monkeys Exposed to Gamma Rays" (Movie)

Rio Grande Chapter of the Association for Computing Machinery, Albuquerque, Oct. 5-6:

"Computer Control of the Los Alamos Linear Accelerator" by H.S. Butler, MP-1

Presentation at the Physics Department, Highlands University, Las Vegas, N.M., Oct. 19:

"Cryogenics and Cryogenic Engineering" by F.J. Edeskuty, CMF-9.

American Physical Society Meeting, Nuclear Physics Division, Madison, Wisc., Oct. 23-25:

"Highly Polarized Neutrons from the s-wave $T(d,n)^4He$ and $D(t,n)^4He$ Reactions" by G.G. Ohlsen, P-12

"A Study of the (t,p) Reaction on $^{90, 92, 94}Zr$" by J. G. Beery, P-10; D. D. Armstrong, P-12; A. G. Blair, P-DOR; E. R. Flynn, P-10; and R. M. Drisko, Oak Ridge National Laboratory, Oak Ridge, Tenn.

"T=23 1/2 Analog States Observed in $^{208}Pb(t,p)^{210}Pb$" by D. D. Armstrong, P-12, and E. M. Bernstein, University of Texas, Austin, Texas

"A Search for the Ground State of ^5H by Means of the T(t,p) Reaction" by P. G. Young, P-12, G. G. Ohlsen, P-DOR, and R. H. Stokes, P-12

"The Polarization of Neutrons from the $T + D \rightarrow n + {}^4He$ Reactions" by G. S. Mutchler and J. E. Simmons, both P-DOR

"Differential Cross Sections for the Elastic Scattering of Protons from ^{40}Ca Between 9.8 MeV and 21.7 MeV" by J. F. Dicello, P-12; G. J. Igo, P-DOR; W. T. Leland, P-10; and F. G. Perey, Oak Ridge National Laboratory, Oak Ridge, Tenn.

"The $^{12}C(t,p)^{14}$ Reaction at 16 MeV and 20 MeV" by P. W. Keaton, Jr., P-DOR; D. D. Armstrong, P-12; J. G. Beery, P-10; R. M. Drisko, Oak Ridge National Laboratory; N. R. Roberson, Duke University; and L. R. Veeser, P-DOR

"Velocity-Dependent Potential Parameterization for $^1S_0$ Proton-Proton Scattering" by J. E. Brolley, P-DOR, and T. Kelley, University of New Mexico, Albuquerque

"The Levels of ^{210}Pb Excited in the $^{208}Pb(t,p)^{210}Pb$ Reaction" by P. D. Barnes, P-DOR; D. D. Armstrong, P-12; E. R. Flynn, P-10; G. J. Igo, P-DOR; and R. Woods, P-9

"Analogues of States in ^{181}Hf" by F. A. Rickey, Jr., P-DOR, D. L. Allan, P-3, and H. C. Britt, P-DOR

Institute of Electrical and Electronic Engineers Thermionic Conversion Specialists Conference, Palo Alto, Calif., Oct. 30-Nov. 1:

"Damage Flux in Critical Assemblies" by R. C. Anderson, N-5

"High Performance Heat Pipes" by J. E. Kemme, N-5

"Heat Pipe Performance in a Space Environment" by J. E. Deverall and E. W. Salmi, both N-5

"The Viscosity of Cesium Vapors" by C. V. Weaver, N-5, and J. Todd, W-4

"Optimization Calculations for Thermionic Diodes in a Series Stack" by C. D. Sutherland and T. G. Frank, both N-5

"Retention of Fission Gases in the UO_2 Phase of Mo UO_2 Cermets Irradiated at High Temperature" by W. A. Ranken, M. C. Chaney and A. J. Patrick, all N-5 (Classified talk)

"Isothermal Irradiation Assembly for Study of Fast Neutron Damage to Ceramics" by W. A. Ranken and C. S. Summers, both N-5

"Heat Pipe Startup Dynamics" by T. P. Cotter, N-5

Presentation at the University of Wyoming, Laramie, Wyo., Oct. 31:

"Superfluid Phenomena in Multiply-Connected Geometries" by P. T. Sikora, T-9

Radiochemistry Division Seminar, Lawrence Radiation Laboratory, Livermore, Calif., Oct. 31:

"Cross Section Measurements Using Nuclear Explosives as Neutron Sources" by B. C. Diven, P-3

Presentation at the Department of Mechanical Engineering, University of Utah, Salt Lake City, Utah, Nov. 2:

"Scylla 1A Characteristics and Diagnostics" by V. A. Finlayson, P-15

Seminar on Isolde Chemistry Problems, CERN, Geneva, Switzerland, Nov. 2-3:

"Some Early Concepts of Proton Targets for an On-Line Isotope Separator Project on the LASL Meson Factory" by B. J. Dropesky, J-11, and D. R. F. Cochran, MP-6

Seminar at Temple University, Philadelphia, Pa., Nov. 6:

"The Complex Carbohydrates of Mammalian Cells" by P. M. Kraemer, H-4

Presentation at the Meeting of the Delaware Valley Chapter of the Health Physics Society, Philadelphia, Pa., Nov. 6:

"The Nuclear Weapons Incident in Spain" by W. H. Langham, H-4 (Invited talk)

Conference on Applied Superconductivity, Austin, Texas, Nov. 6-8:

"Automatic Superconducting Switches" by H. L. Laquer, CMF-9

American Physical Society Meeting, Division of Plasma Physics, Austin, Texas, Nov. 8-11:

"Numerical Study of a High-Beta Toroidal Plasma Equilibrium" by T. A. Oliphant, P-18

"Solution of the Equations of Motion for a Particle in an Arbitrarily Time-Dependent, Uniform Axially Symmetric Magnetic Field" by H. R. Lewis, Jr., P-18

Presentation at the New Mexico Institute of Technology, Socorro, N.M., Nov. 9:

"Satellite Observations of the Solar Wind" by A. J. Hundhausen, T-12

Annual Fall Meeting of the Colorado-Wyoming Section of the American Association of Physics Teachers, Colorado State University, Fort Collins, Colo., Nov. 11:

"Demonstration Films from Computer Simulations" by J. A. Palsedge, P-18

The Camille and Henry Dreyfus Lecture, presented by the Department of Chemistry, University of Kansas, Lawrence, Kans., Nov. 13:

"Element Synthesis in Thermonuclear Neutron Sources" by G. A. Cowan, J-11

Sandia Surface Seminar, Sandia Corporation, Albuquerque, Nov. 16:

"Low Energy Electron Diffraction Studies of Polar (0001) Surfaces of ZnO, CdS and CdSe" by B. D. Campbell, CMB-8

Informal Seminar, Johns Hopkins University, Baltimore, Md., Nov. 16:

"1967 Auroral Rocket Probe Results" by J. K. Theobald, J-10

Presentation at the American Physical Society Meeting, New York, N.Y., Nov. 16-18:

"Observed Properties of the Interplanetary Medium" by A. J. Hundhausen, T-12 (Invited talk)

"Pressure Dependence of Band Structure and Fermi Surface in Close-Packed Cesium" by E. A. Kmetko, CMF-5

"An Experimental Study of the Configuration Connections Between the States of an Odd and an Even Mass Nucleus" by D. L. Allan, P-3 (Invited talk)

"Crystal Structure Changes in Solid H_2 and D_2" by R. L. Mills, CMF-9 (Invited talk)

Physics Department Colloquium, Argonne National Laboratory, Argonne, Ill., Nov. 17:

"Time-of-Flight Neutron Cross Section Measurements Using Nuclear Explosives" by W. K. Brown, P-3

Presentation at the American Mathematical Society Meeting, Albuquerque, Nov. 18:

"Visual Hull of a Polyhedron" by W. A. Beyer, T-8

Presentation at the University of Colorado, Boulder, Colo., Nov. 27:

"Superfluid Phenomena in Multiply-Connected Geometries" by P. T. Sikora, T-9

Presentations at the University of Pittsburgh, Pittsburgh, Pa., and the University of Minnesota, Minneapolis, Minn., Nov. 27 and Dec. 1:

"Relativistic Three-Particle Equations" by J. E. Young, T-9

Presentation at the National Bureau of Standards, Boulder, Colo., Nov. 28:

"The Josephson Effect—An Elementary Presentation" by P. T. Sikora, T-9

Presentation at Surface Seminar, Sandia Corporation, Albuquerque, Nov. 30:

"Some Observations and Questions about LEED Studies of UO_2" by W. P. Ellis, CMB-8

Presentation at the Physics Department, University of New Mexico, Albuquerque, Dec. 1:

"Characteristics of Los Alamos Meson Physics Facility Accelerator" by F. R. Tesche, MP-5

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the technical side . . .

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Presentation at New Mexico Institute of Mining and Technology, Physical Chemistry Class, Socorro, N.M., Dec. 4:

"Cryogenics and the Properties of Matter at Low Temperatures" by A. F. Schuch, CMF-9

Presentation at Meeting of the Northeastern New York Chapter of the Health Physics Society, Schenectady, N.Y., Dec. 5:

"The Nuclear Weapons Incident in Spain" by W. H. Langham, H-4 (Invited talk)

Presentation at the American Vacuum Society Meeting, Local Section, Los Alamos, Dec. 5:

"Filament Conditioning and Analytical Mass Spectrometry" by E. D. Loughran, GMX-2

25th High Temperature Fuels Committee Meeting, San Diego, Calif., Dec. 5-7:

"Contribution to the 25th High Temperature Fuel Committee Meeting" by R. H. Perkins, K-2

Medical Research Center Seminar at Brookhaven National Laboratory, Upton, N.Y., Dec. 7:

"The Effects of Physiologically Damaging Doses of Radiation on the Performance of Trained Primates" by W. H. Langham, H-4 (Invited talk)

Colloquium at Texas Technological College, Lubbock, Texas, Dec. 7:

"Inelastic Scattering of Polarized Protons from Medium-Mass Nuclides" by A. G. Blair, P-DOR

Presentation at Kansas State University, Manhattan, Kans., Dec. 8:

"Neutron Capture Gamma Ray Spectroscopy" by H. T. Motz, P-DO

American Institute of Aeronautics and Astronautics Student Meeting, Texas A&M University, College Station, Texas, Dec. 12:

"The Nuclear Rocket Propulsion Program" by W. L. Kirk, N-DO

"Plasma Propulsion" by D. B. Fradkin, N-7

Thirteenth Meeting of the AEC Coated Particle Fuels Working Group, La Jolla, Calif., Dec. 12-13:

"Development of Coated Particles" by R. J. Bard and A. W. Savage, Jr., both CMB-8

American Physical Society Meeting, Pasadena, Calif., Dec. 18-20:

"Elastic Scattering of Fast Neutrons by Liquid Deuterium and Tritium" by J. D. Seagrave, J. C. Hopkins and P. W. Keaton, all P-DOR

"Nuclear Photon Scattering" by R. R. Silbar, T-9, and Herbert Uberall, Catholic University, Washington, D.C.

"The Energy Bands of Barium" by E. A. Kmetko, CMF-5

"Fast Neutron Scattering from Liquid Hydrogen Isotopes" by J. D. Seagrave, P-DOR (Invited talk)

American Association for the Advancement of Science Meeting, New York, N.Y., Dec. 26-31:

"Computer Experiments in Fluid Dynamics" by C. W. Hirt, T-3

"Technical Developments from Fusion and Plasma Physics Research" by J. Marshall, P-17

"Conjugation in **Stentor coeruleus**" by B. R. Burchill, H-4

new hires

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Congress Passes Multi-Family Housing Bill

By Barbara Storms

At Atom press time last month, officials of the Atomic Energy Commission and the Department of Housing and Urban Development were still working up a schedule to expedite the sale of Los Alamos apartment buildings under new procedures provided in legislation passed by Congress late in November. The bill, which amends the Atomic Energy Act of 1955 to permit more flexibility in awarding priorities for purchase of the buildings, was still awaiting Presidential signature.

Although he was not prepared last month to give any dates or times for the sale, AEC Area Manager Herman Roser told a Congressional hearing last August that the sale probably could begin about two months after passage of the legislation. He said the sale might be completed in a year but could take up to two years, depending upon the number of buildings sold during the first priority offering.

The amendment makes it possible for occupants, as individuals or groups, and anyone else who is project-connected or has resided in the community for the previous six months, to obtain priority.

Specifically, each occupant of an apartment would be given a priority interest in the purchase of his building. The occupant could then assign his interest to another occupant or group of occupants or to another entity made up of Los Alamos residents or project-connected persons. The occupant or entity who could demonstrate that he represented at least 60 per cent of the occupants of the building would be given first priority to buy.

Second priority to buy would be awarded to an entity whose membership consists of eligible Los Alamos residents and project-connected persons who have the priority interest of at least one occupant and who agree to occupy at least 70 per cent of the housing units in the building.

Anyone who has purchased, either individually or jointly, a single-family house or duplex house or unit in Los Alamos will not be permitted to participate in the purchase of an apartment house.

Any occupant who does not wish to participate in the purchase of his building will be entitled to a 15-month lease on his unit from the AEC, provided he applies for such a lease within 30 days of the granting of priority.

The law also provides that the discount, financing and indemnity provisions of the Atomic Energy Act, which applied in all previous housing sales in Los Alamos, will apply to the apartment negotiations.

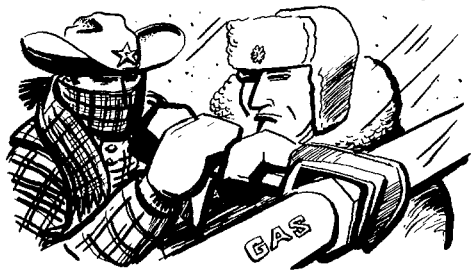
The sale shifts into gear again after a 15-month postponement brought about by complaints from apartment occupants who objected to the requirement in the original law that limited the sale to legally-organized cooperatives. After a public hearing early in 1967, an ad hoc committee on multi-family housing, appointed late in 1966, proposed changes similar to those in the new law. Bills, nearly identical to the new law, were submitted to Congress in April by Senator Clinton Anderson and Congressman Thomas Morris.

In addition to eliminating the cooperative requirement, the new law makes it possible for widows and retired people to participate in the sale by including all Los Alamos residents. It also is designed to provide some rental housing on the Hill by requiring only 60 to 70 per cent occupancy of the building by purchasers.

The law does not specify what action will be taken in the event that a building cannot be sold to either first or second priority holders.

Roser told the Congressional hearing last summer that an intensive informational campaign — about six months for each priority offering — would be essential to make sure the public completely understands each aspect of the program. He said his office would take every step necessary to implement the sale as quickly as possible.

20 years ago in los alamos



Culled from the files of Los Alamos Times, January, 1948, by Robert Y. Porton

Cold Wave Emergency

Security service, the FBI—and all the front line forces engaged in keeping Los Alamos a running concern—were impotent against the enemy that struck here Tuesday. Old Man Winter, armed with sub-zero temperatures, pretty well had his way working through his fifth column, the gas line. As gas pressure dropped and furnaces stopped operating, the top echelon of AEC and Zia Company climbed into battle dress (boots, sweaters and hunting jackets) and moved up to the front line and took over command in person. Local residents spent a frigid 36 hours before service was restored.

Secretary Royall Visits Site

Secretary of the Army Kenneth C. Royall, accompanied by Major General Leslie R. Groves, was a visitor to the project this week. The secretary and his party met with local officials and were taken on a brief tour of the area. Royall called for intensified scientific research to keep the U.S. far ahead in science and technology. He stated, "We are making marked and encouraging progress, but we must not be lulled into a scientific 'Maginot Line complex'."

AEC's Hill Construction Program

The Atomic Energy Commission's production chief, Walter J. Williams, outlined construction plans for the next several years for one of the major nuclear energy installations here at Los Alamos before a joint Senate-House housing committee in Washington. Included are new laboratory facilities, modernization and expansion of existing plant facilities and permanent replacement of temporary wartime structures. He announced that the commission's program has plans for a permanent community of more than 8,000.

International Rejects Petition for Hill Rotary

Rotary International has turned down an application to form a local unit because it does not consider Los Alamos a permanent installation. According to F. Robert Wegner, acting for the organization committee, the meeting planned for this evening in the high school will be held. Representatives of another service organization will be present to discuss the forming of a chapter here. (Editor's note: This month the Los Alamos Kiwanis Club will celebrate its 20th anniversary.)

Feature at Hill Theater

Showing at Theater #2, Wednesday and Thursday, Jan. 14 and 15, Warner Brothers presents a comedy, "That Hagen Girl", starring Ronald Reagan and Shirley Temple.

what's doing

TRAVEL SLIDE PROGRAM: Mesa Public Library, 7:30 p.m.
Thursday, Jan. 18—"Russia" by Robert Keepin

LOS ALAMOS LITTLE THEATER: "The Odd Couple," by Neil Simon, Friday and Saturday, Feb. 2 and 3, 8:15 p.m., Civic Auditorium. Season tickets at $6 and single admission at $2 available at the box office of the auditorium. Season tickets also available from Kay Anderson at 2-3510, or Betty Lilienthal at 2-4927. For reservations on season tickets, call Doris Schonfeld, 672-3464.

LOS ALAMOS CHORAL SOCIETY (with Sinfonietta), Epiphany Concert, Saturday, Jan. 13, 8:15 p.m., First Methodist Church, Los Alamos. To be repeated Sunday, Jan. 14, 4 p.m., St. Francis Cathedral, Santa Fe. Included will be Bach Cantata No. 65 for the Epiphany and Magnificat by Vaughan-Williams. Tickets, which must be purchased in advance, available at Gifts-World Imports; Hayes Jewelers and Decols in Los Alamos, or call Meridith Matlack. $1.50 for adults; 75 cents for students.

LOS ALAMOS SKATING ASSOCIATION: Schedule for use of ice rink, Los Alamos Canyon:

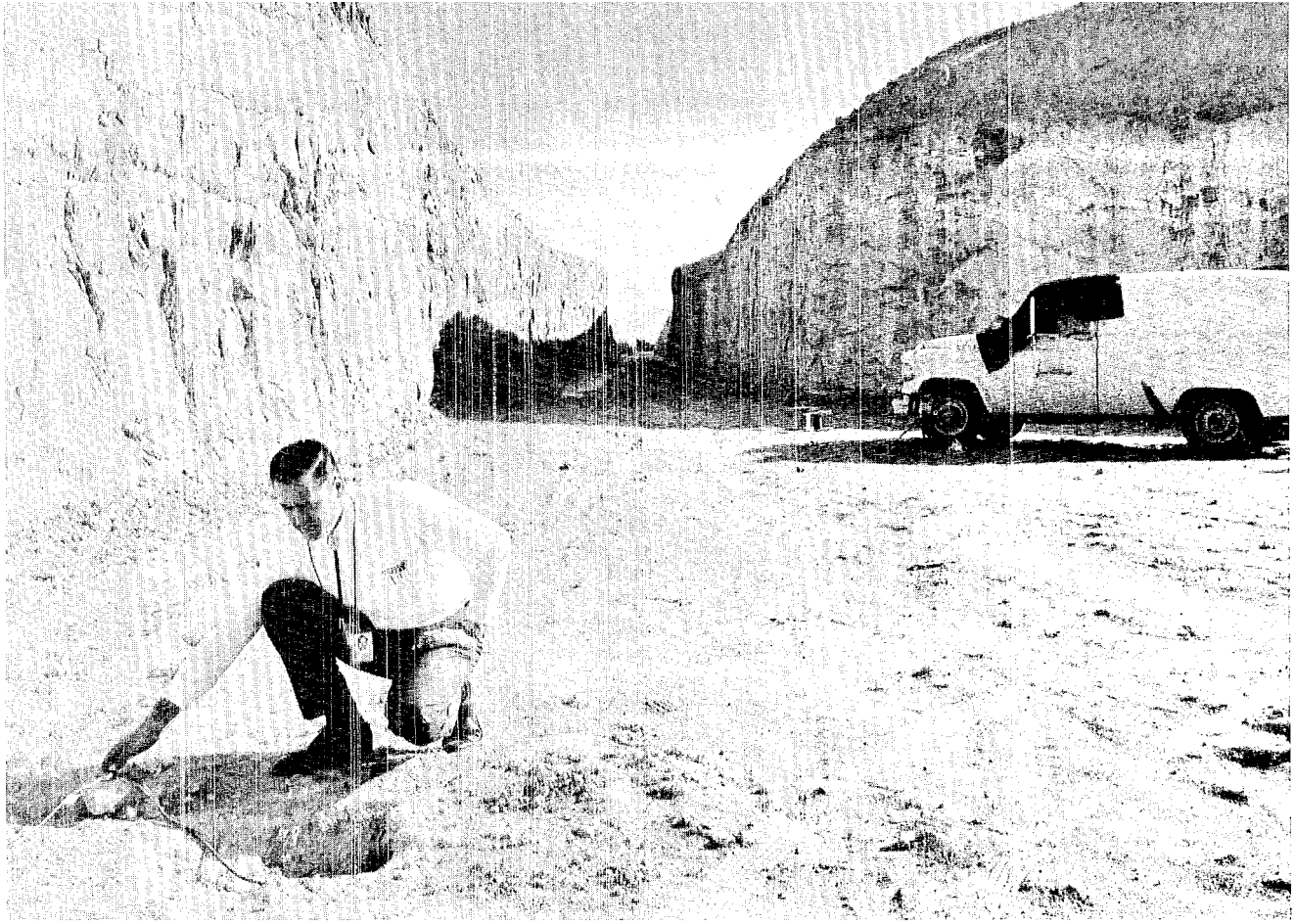
Mondays: After-school session, 3 to 5 p.m. (small children encouraged to attend.) General skating, 7 to 9:30 p.m. (Family night—special family rate $1.25). Free skating lessons.
Tuesdays: "Mothers and Tots" session, 9:30 to 11:30 a.m., After-school session, to 5 p.m.; adults only, 7:30 to 10 p.m.
Wednesdays: After-school session, 3 to 5 p.m.; general skating, 7 to 9:30 p.m.; hockey team, 9:30 to 10:30 p.m.
Thursdays: "Mothers and Tots" session, 9:30 to 11:30 a.m.; After-school session, 3 to 5 p.m.; Figure Skating Club patch session, 6 to 7:30 p.m.; adults only, 7:30 to 10 p.m.
Fridays: After-school session 3 to 5 p.m.; "Game Night" (primarily for teenagers), 7 to 9:30 p.m.
Saturdays: Hockey during the morning; general skating, 2 to 4:30 p.m.; "Date Night" (high school and young adults), 7 to 10 p.m.
Sundays: Professional lessons during morning; general skating, 2 to 4:30 p.m.; Figure Skating Club patch session, 6 to 7:30 p.m.; adults only, 7:30 to 10 p.m.

Season tickets $4 for students through high school; $7 for adults. General admission: 25 cents; adults, 50 cents. Rink telephone is 2-4500.

OUTDOOR ASSOCIATION: No charge; open to the public. Contact leader for information about specific hikes.

Saturday, Jan. 20, Valle Canyon from Pajarito Mountain. Virginia Winsor, leader, 2-3440.
Sunday, Jan. 28, Pipeline Road. Ed Kmetko, leader, 2-3173.
Sunday, Feb. 11, Guaje Canyon from Ski Area. Ken Ewing, leader, 8-4488.

EXHIBIT OF PAINTINGS by Hal Olsen, D-3, at LASL Credit Union offices.



Recordings of the vertical and horizontal motion on Mesita de Los Alamos, where the proposed meson facility will be constructed, were made at 12 locations during Project Gasbuggy on Dec. 10. (Gasbuggy involved the detonation of a thermonuclear device 4,250 feet underground slightly more than 100 air miles northwest of Los Alamos. It was the first joint government-industry experiment in the AEC's Plowshare program to develop peaceful uses for nuclear explosives. The purpose was to fracture gas-bearing rock in such a manner as to permit the gas to flow more freely from the rock.) Dean Keller, ENG-1 (above) was in charge of the Mesita de Los Alamos measurement project for the LASL Engineering Department. The U.S. Coast and Geodetic Survey team which monitored these vibrations on contract to Engineering was under the direction of Wendell Mickey, chief of the C. & G.S. vibrations and engineering projects branch. Preliminary results indicate that Gasbuggy caused an acceleration of less than 0.001 gravity in the Los Alamos area—just enough to feel if you are sitting or lying still—and very close to the acceleration predicted by the U.S.C. & G.S. This is slightly less than 1.0 on the Richter scale. After the records are analyzed it will be possible to predict vibration effects from similar detonations, Keller said. Other tests conducted over the past year used a ground vibration machine, the detonation of high explosives, impact tests and truck traffic to determine ground vibration characteristics of Mesita de Los Alamos. The instruments provided by the Coast and Geodetic Survey are so sensitive that an earth movement equivalent to 1/80 of the diameter of a human hair can be detected.

BACK COVER:

A few of the estimated 100,000 wires used in the WIREX program on UHTREX ended in a cabinet behind the control room. Story begins on page 1.

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